NATURE MAGAZINE

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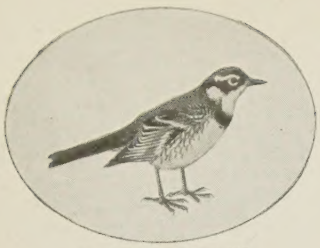
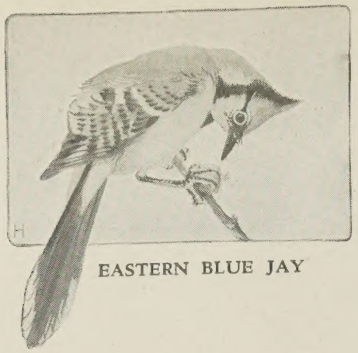
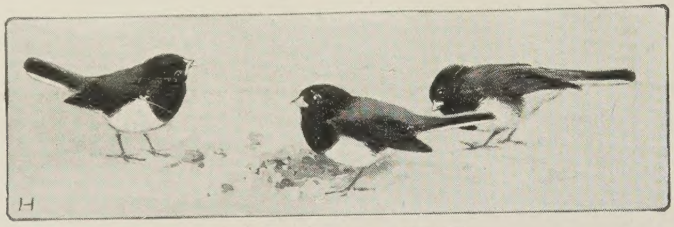


VARIED THRUSH



EASTERN BLUE JAY

THE CHEWINK



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By R. Bruce Horsfall

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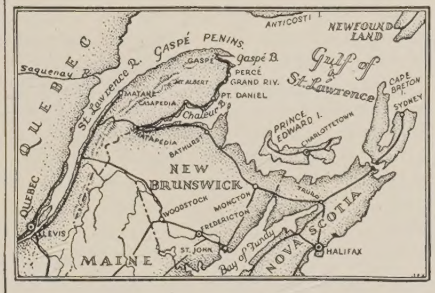
Edited by
ELEANOR WALKER

THE SHORE trip around Gaspé Peninsula, lying between the St. Lawrence River and the Bay of Chaleur, offers the combination, rare in this continent, of unusually gorgeous maritime scenery with the charm of quaint people whose folklore and customs are the same today as two hundred and fifty years ago. Gaspé, the oldest part of Canada, discovered in 1535 by Jacques Cartier, is still peopled by the French, on the north shore by Canadian French, mostly small farmers and lumbermen, and on the south shore by Acadian French, fisher folk, a simple people docilely directed in all affairs by the parish priest, a melancholy people situated as they are with the sombre forest always behind, the forbidding sea always in front. In Eastern Gaspé are many fishermen directly descendent from men of the Isles of Jersey and Guernsey.

There are all sorts of ways to see Gaspé. Many people go to and from Europe via the Canadian Pacific particularly to gaze on the sheer precipitous cliffs of Northern Gaspé rising from the St. Lawrence. If you are coming East by rail through Canada, you may choose either the Canada and Gulf Terminal Railway as far as Matane, or a steamer which makes weekly trips from Montreal calling at the largest coast villages of Gaspé. Or you may prefer a boat trip as far as Halifax making rail connections from



there for Matapedia in Southwestern Gaspé. Some form of Canadian rail transportation circuits most of the coast of the peninsula except from Gaspé to Matane. You will want to traverse this distance (190 miles) over the Perron Boulevard (which also circuits almost the whole peninsula) anyway because it is reputed by geographers to be "the most magnificent road in the world, not excepting the Amalfi Drive, the coast road in Southern California, and the mountain road from Port Antonio to Kingston in Jamaica." From sea level at the water's edge, the car streaks up to a height of 700 or 800 feet, makes a turn, and then down again to the water's edge and repeats along the shore. Sometimes the road is carved out of the steep mountain side with nothing between it and the sea but a strong adequate rail. The beauty of the road zigzagging between mountain and sea is unsurpassed.

Percé, situated on the eastern end of the peninsula, typifies some of the charm of

(Continued on Page 3)

Santa Fe

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EDITED BY ROBERT T. LOWELL

Three Requisites for Good Pictures

AN expert has boiled down all the "do's and don'ts" to give us the three fundamental requisites for making good pictures. Here they are:

I. Proper Exposure: (To produce the right kind of negative.) Correct adjustment of lens diaphragm and shutter speed for existing light conditions. (With a motion picture camera the shutter speed is, of course, fixed at a definite speed.) The manuals of directions furnished by camera manufacturers contain good exposure tables that we should follow.

II. Correct Focus: (To give a clearly defined, sharp image of the subject.) Obtained by judging distance from lens to subject accurately and setting the pointer at the corresponding distance mark on the scale. Some cameras like the box type do not require the lens to be adjusted—they are known as "fixed focus" cameras. With such cameras we should not work closer than 8 or 10 feet unless using a little supplementary lens known as a portrait attachment.

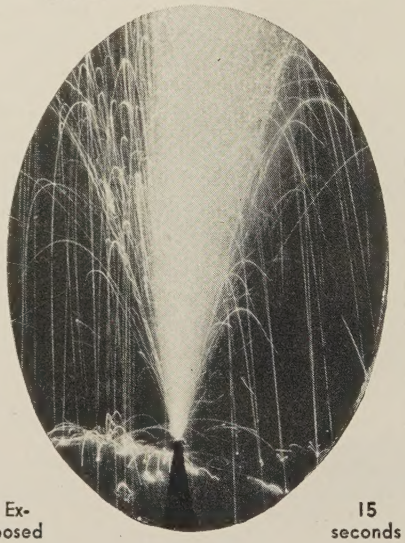
III. Attention to Composition: (To make the picture pleasing to look at.) The arrangement of objects within the picture area to give good balance and the exclusion of objects irrelevant to the story being told. The angle from which we "shoot" often has much to do with composition.

Made with Kodak Portrait Attachment over Camera Lens

Further Information on Request

LACK of available space prevents going into great detail concerning the different phases of photography referred to in the condensed articles on this page. We shall, however, aim to hit the interesting high spots—the important points—in what we talk about.

NATURE MAGAZINE will gladly furnish beginners further information (through correspondence) on any subject in photography in which they may be interested. Address inquiries to Editor, Photographic Department.



Exposed 15 seconds

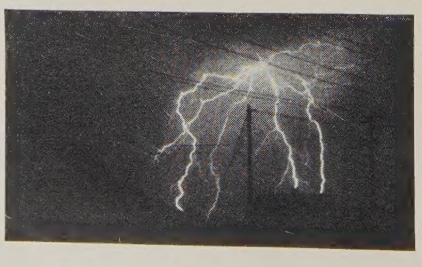
Pyrotechnics

Man Made and Nature's

JULY 4 offers unusual chances for fascinating night pictures. The charm of fire-works displays can be recorded on our camera film. Likewise, we can obtain photographs of lightning flashes—nature's *own* pyrotechnics. The making of such pictures is a much simpler matter than many believe. To capture the graceful tracery of night fireworks, it is only necessary (with snapshot outfit) to place the camera on a firm support, aim towards the display, open the shutter, after setting for "time" and close it when the display has died down.

It is best, however, not to try to include too much of a large exhibition in one picture. Train your lens on a particularly attractive burst or design.

Pictures of streaks of lightning are made in a like manner, except that the shutter may have to be open for a longer time when we are waiting for a flash. A little patience and experimenting will bring startling results. Just point the camera toward the place where the flashes are occurring, open the shutter and after a streak appears, close it. Don't forget to turn a new section of film into position immediately.



Camera Shutter Open 2 Minutes

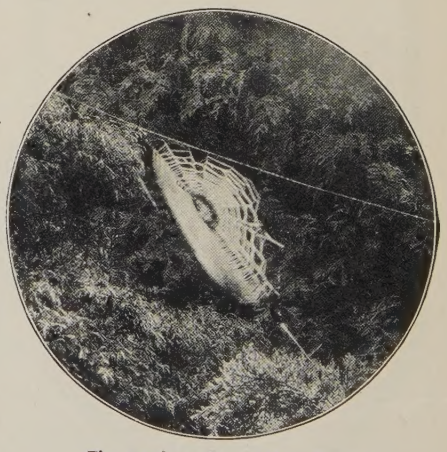
Dame Spider's Jeweled Necklace

A GOOD spider web picture whether made with "snapshot" or movie camera is a most interesting addition to one's collection of Nature study photos.

Early morning, before the dew has been absorbed, is the time to get best results. It is then that the web glistens and sparkles in the sunlight, not unlike a jeweled necklace. Take "close-ups" to get large images and make several "shots" from different angles. A side or back lighting, if you can get it, will give added lustre to the web, causing it to scintillate. Be careful, however, that the direct rays from the sun do not shine into your lens. If Dame Spider is at home, perhaps you can get her to give "action" to your picture if you are a movie enthusiast.

Just above the web you will see a single strand from which the web proper seems to be suspended. This, we are told, is a private "telegraph wire." This silky thread transmits vibrations from any part of the web proper in which a "caller" may have become entangled. Touch it gently and Mrs. Spider may rush out to welcome a guest to breakfast. Be ready to catch, photographically, the look of disappointment on her face!

Notice in the picture how clearly the "telegraph wire" shows. A breeze disturbed the web and caused the slight blurring.



The Back Lighted Web Picture

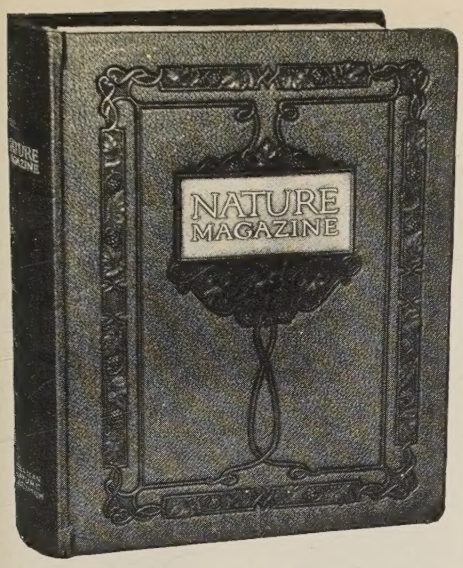
Color! A Dream Come True

THE dream of all camera enthusiasts has indeed come true in that pictures in natural color can now easily be made and in *motion pictures,* too! What a chance for the Nature lover with a Ciné camera.

Vitacolor and Kodacolor, the trade names for the two color films, are well past the experimental stage.

See an exhibition in the store that specializes in motion picture apparatus for the amateur.

Kodacolor, we are told, has recently been reduced in price.



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TRAVEL DEPARTMENT

(Continued from Page 1)

Gaspé. Here beyond the straggling village, "Les Murailles" drop steeply into the sea and from these high precipitous cliffs you have a wondrous view of land and water. The ocean, for 124 miles out from Percé, has been dedicated both by Ottawa and Washington as a bird sanctuary, because Percé Rock, just off the coast, and Bonaventure Island, farther out, are the home of thousands of birds. Percé Rock looks like a huge, coppery-hued, steep-sided iceberg with an arched hole through one end of it. If you have a telescope, you may watch the mother birds among the herring gulls and the crested cormorants feeding their young in seaweed nests, or teaching them first to fly in the air, and then to dive into the water after fish. Then you will go to Bonaventure. A boat guide to that island says that all travelers should be tied in their seats because they become dangerously excited when they first glimpse, on the island ledges, the thousands of snow white gannets with their black-tipped wings and saffron tinted heads. Bonaventure has the largest colony of gannets on the Atlantic Coast. It is the center of legends about its old owner, the brigand Peter Duval, who in his privateer, the Vulture, harried the French coast during the war with Bonaparte.

In the village of Percé, you will find "characters," men who, in this way or that, wrest a meagre living from the sea. Cod fishers bring in a heavy haul, and then work by lantern light far into the night, "splitters" cutting open the fish on long tables, and "salters" then taking them over in the salting room. Other fishermen use the night to "jig for squid." Half a mile beyond the government pier stretches a long line of black boats, above which bob up and down the flickering lantern lights. "Jigging for squid" means to catch fish bait for the next day's haul of cod. The lobster-pot man and the octogenarian with the ox-cart who comes to gather seaweed "fertilizer" for the fields are "characters" recruited from those too old to go deep-sea fishing.

And above all stands on the mountain top, the French fisherman's chief protectress, Ste. Anne whose sharp eyes under beetling brows pierce mist and dark to guard over "les pêcheurs."

Gaspé, with its wonderful harbor, has one of Quebec's famous hostelries—Baker House. From here fishermen and hunters can find nearby salmon and big and small game.

The north shore of Gaspé is the most startlingly beautiful part of the peninsula. Bold capes, steep, high, jut out into the St. Lawrence. On the north shore is Metis-sur-Mer, one of Quebec's most famous summer resorts. The geological formation along this coast is interesting. The Canadian geologist Monsignor La Féaume says "one would have a very good idea of the orography of this region could he conceive the instantaneous freezing of the waves of the Atlantic."

The old motto is, "Once to Gaspé, often to Gaspé." If you have plenty of time, you might well combine a Gaspé trip with travel in New Brunswick, Nova Scotia and Newfoundland.

WRITE TO THE TRAVEL EDITOR WHEN YOU NEED ADVICE

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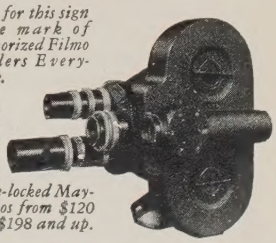

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NATURE NEWS AND VIEWS

State Birds

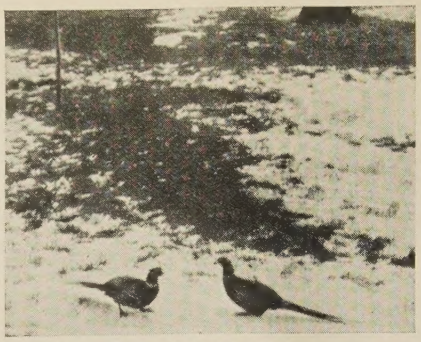
Colorado will soon be the twenty-second state to have a state bird. The school children are voting on the four designated by Miss Katherine Craig, State Superintendent of Public Instruction, and the county superintendents—meadowlark, mountain bluebird, robin and long-crested jay. The lark bunting was designated the state bird in a bill which passed the House last year but failed in the Senate. For some inexplicable reason this is not included in the voting, although it was leading by two to one in Larimer County during a previous balloting, and has the support of several Chambers of Commerce and a part of the press. With the exception of the jay, the birds now being voted on in Colorado already represent other states. The meadowlark has been chosen by Kansas, Nebraska, Oregon, and Wyoming; the robin by Michigan, Virginia and Wisconsin, and the bluebird by Missouri and New York. So firmly do people become attached to the species with which they are most familiar, that out of some eight hundred distinct species and four hundred sub-species of birds, but thirteen birds have been chosen by 21 states and the District of Columbia. It will be interesting to see if Colorado, apparently having disregarded its former preference for the lark bunting, will add to this rather unfortunate duplication.

Hooking Rides

The American habit of "stowawaying" and "bumming" rides has evidently given the migrating avian host new ideas, if the tactics of a group of orioles, vireos, wrens, redwings and other songsters who calmly rode from the Tortugas to New York on the oil tanker John D. Archibald are any indication of what is happening. These birds came on the ship one night, and made merry music for the sailors of the Standard Oil ship all the way up the Coast. The rigging was thick with them. A large party of wrens took possession of the crow's nest; a dozen pairs of scarlet tanagers used the spare steering wheel. Warblers clung to the funnel stays; grosbeaks and catbirds promenaded the fore-and-aft bridge. Bread crumbs were spread for the stowaways, as the forest-atmosphere they gave the ship was considered to be well worth their keep. But their coming on board, with accompanying sounds more tuned to woodland dells than the deep, gave the crew something to wonder about. "Imagine going to sleep knowing you are in the Gulf of Mexico and waking up thinking for sure you are in the Catskill Mountains," said one of the sailors. Perhaps, however, after birds become more accustomed to hoboing rather than flying their way north, their presence will cause no surprise.

Nature Club Exchanges

The Hamilton County Nature Study Club, located at Noblesville, Indiana, desires to exchange programs with other Nature Clubs throughout the country. Much valuable help can be given by discovering what other clubs are doing, the organization feels. Jean Clarke of Noblesville is the secretary, and all exchanges should be sent to him.

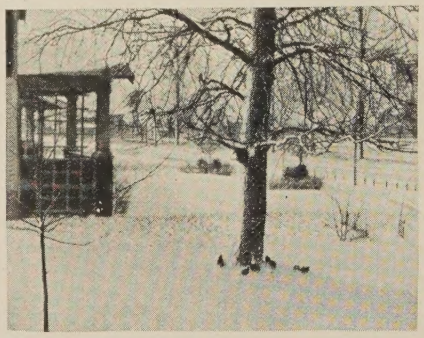


"WHO'S BOSS HERE?"

Two cock pheasants about to settle the question

Tamed Birds

Birds grow used to human proximity when they associate dwellings with food. Mr. Ralph Kleckner of Tiffin, Ohio, amply proved this fact last winter, when his lawn



QUAIL FEEDING TIME

A group around a tree in Mr. Kleckner's front yard

became the rendezvous for several flocks of pheasants and quails. His residence is near the outskirts of the city. Both on the other side of the street and in back of his home the land has not been built up, and from both sections birds come to enjoy the corn put out originally for fox-squirrels. On one occasion, two cock pheasants, one from each side of the street, engaged in vigorous combat for control of the yard. Mr. Kleckner has set out more than 40 pounds of sunflower seed during the past winter, and blue jays, cardinals, nuthatches, titmice, and downy and hairy woodpeckers are numbered among his guests.

Poetry Contest

The Chattanooga Writers Club, Chattanooga, Tennessee, announce their annual poetry contest for the Elberta Clark Walker Memorial Prize, established by Robert Sparks Walker, Nature writer and author, in memory of his wife. Poems must be original and unpublished, not exceeding 72 lines in length, signed with the pen name of the author with his real name enclosed in a separate sealed envelope bearing the title of the poem on the outside. The contest is open from May 1 to November 1. The first prize is $20, with an additional prize of $10 given to a southern writer living in the South. Contestants may submit one poem each to Mrs. Lucy H. McDonald, 709 Vine Street, Chattanooga.

Mather Tree Memorial

In addition to raising funds for a permanent man-built memorial to be erected as a tribute to the idealism and achievement of the late Stephen T. Mather, first Director of the National Park Service, organizations and individuals in all parts of the country are planting memorial trees in his honor. This movement has been started by the National Life Conservation Society under the direction of Mrs. C. C. Marshall, and has rapidly found acclaim. Many groups are planning to plant and dedicate their trees to Mr. Mather on July 4, his birthday, as part of the Independence Day celebration, and others are waiting for Arbor Day or Conservation Week, or for the fall months. The movement to dedicate living, growing memorials to a man who has done so much to preserve trees and the out-of-door heritage of America is indeed worthwhile, and should have unqualified support. It is to be hoped that any club or city with conservation ideals will join in. Mrs. Marshall will send complete information upon request, and all those who have already planted Stephen T. Mather trees are asked to get in touch with her. Her address is 2239 Tiebout Avenue, New York City.

Michigan Out-Door Press

Indicative of the growing interest in the out-of-doors, thirteen leading Michigan dailies have adopted, during the past few years, regular weekly outdoor feature pages. These give an account of the happenings in conservation, interesting stories about birds and animals, and general information on the out-of-doors. They are helping to create a sportsmanlike attitude among hunters and fishermen, and are a great educational force toward the saving of wild life. Ben East, a frequent contributor to Nature Magazine, writes the pages for the Saginaw *News*, the Bay City *Times*, the Flint *Journal*, the Ann Arbor *News*, the Kalamazoo *Gazette*, the Jackson City *Patriot*, the Muskegon *Chronicle* and the Grand Rapids *Press*. The other papers, with the names of the out-door page editors, follow: Pontiac *Press*, A. Bird Glaspie; Detroit *Times*, Lee Smits; Detroit *News*, Albert Stoll, Jr., and Detroit *Free Press*, T. De la Vigne.

Frog Intelligence

Even frogs know good things when they see them, as Mr. and Mrs. Fraser Delany of South Attleboro, Massachusetts have proved. Last year they found a large bullfrog in some marshy spot, and brought him to their artificial pool where luscious angle worms amply repaid him for his dignified ornamentation of the environment. When fall came, they took him back to his natural haunts, where digging in would be much easier than in a concrete basin and where his kind could be found in the spring. Then one morning this spring, a loud croak was heard near the newly renovated pool on the Delany grounds—Rana had come back. He had evidently traveled overland, alone, to the spot where lily pads grew angle worms and life was sweet. Now both the Delanys and the frog are very happy.

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SEE PAGES 33-36 IN THIS ISSUE

Nature in Camps

More and more are summer camps turning their educational programs over to Nature. The program of Camp Quanset, on Pleasant Bay, South Orleans, Massachusetts, is typical of the trend and unusual in the way it is worked out. Each morning a Nature quest is begun, and all the campers hunt for the answer. It may be "how does papa cricket sing?" or "how does a partridge drum?" Awards are given to those who answer ten quests correctly. Common tree leaves, flowers and shells are collected and mounted, and the rank of "honey bee"—one that not only buzzes his inquiring way but also collects honey for future use—is bestowed upon the ones meeting all the requirements. The girls are trained in keeping wild animals under as near natural conditions as possible, the degree of "wise owl" being awarded for this feat, and the final honor of the Camp Quanset "Q" is bestowed upon the campers who demonstrated their sympathy with the wood folk and who had played most intelligently and well the Nature game. The camp is under the direction of Mrs. M. L. Hammatt, 127 Newbury Street, Boston, Mass.

Defending the Starling

The much-maligned English starling has some redeeming qualities, general opinion to the contrary notwithstanding, and the observation of John F. Smith of Berea College, Kentucky, may cause a little more respect, if not affection for the bird. He was sitting in his bird sanctuary one day recently when he heard, coming from a nearby persimmon tree, the songs of an entire group of birds, each of which seemed to be singing in turn. On investigating, he discovered that all the voices came from one starling, who was practicing his newly learned American repertoire. The following birds were imitated with surprising accuracy: cardinal, song sparrow, grackle, chimney swift, catbird, chipping sparrow, bluebird, downy woodpecker, flicker, cuckoo, bobwhite, blue-jay, Carolina wren, sapsucker, scarlet tanager, rose-breasted grosbeak, bobolink, red-headed woodpecker and robin. The investigator comments: "The starling in this vicinity is becoming Americanized so rapidly that I shall not be surprised at any time to hear him repeating the Preamble to the Constitution."

A Brave Rescue

Though only ten years old, Rosamond Palmer of Salem Depot, N. H. showed wisdom and courage beyond her years when she recently rescued a rare egret, shot by a hunter who evidently does not know a game bird from any other kind. The bird fell in a swamp, and the girl waded out into the mud, seized the bird, thrust the sharp, seven-inch beak up her sweater sleeve to prevent being wounded, and took the egret to the Sixteen Acres Bird Hospital conducted by Miss Mary E. Coburn, where it is convalescing. Much discussion has arisen as to how and why the egret, a southern species, went so far from its usual haunts, as only rarely are the birds found north of Maryland. The quick action of Miss Palmer, however, has given the town of Salem Depot a rare find, and as the bird will never be able to fly again, it probably will remain near the home of its young rescuer.

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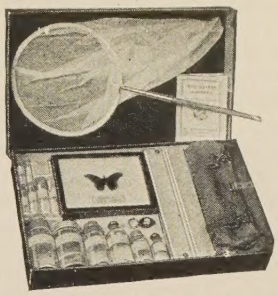

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NELSON C. BROWN
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A Truant's Memorial

Nearly 30 years ago, writes Miss Fatanitza L. Schmidt in the Herkimer County *News*, a little boy played "hookey" from his school at Little Falls, New York. The next day he repented of his sins, and brought to the school, as a token of peace, a beautiful woodland fern, still damp and earth-smelling, from its cool home in spring-touched sod. And his teacher, Miss Emily Oyston, evidently was appeased. She placed the sacrificial offering under a large glass dome and set it in her school room window. For 21 years the fern flourished, with no water to touch it, and no air except that under the glass. In 1923, the fern was presented to the Little Falls Public Library, where it still lives, flourishingly green, as vigorous as the day it was plucked by the truant youth. The gentle teacher who forgave is no longer, and the identity of the boy who "skipped" has long since been lost. But a memorial of the occasion has been preserved, to serve as a guide, perhaps, for other school boys to whom the lure of the out-of-doors grows greater, in spring, than that of books.

Oglebay Park

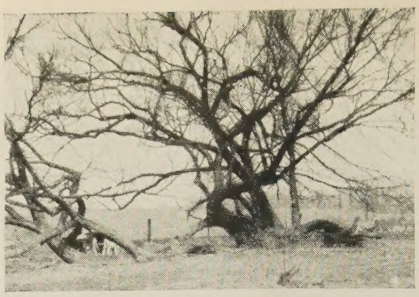
"The People's College" is the designation popularly applied to West Virginia's 750-acre Oglebay Park, a beautiful natural tract with large mansion house and out-buildings left to the City of Wheeling by Col. E. W. Oglebay for purposes of Nature study and recreation. After little more than a year of development under the Nature educational direction of A. B. Brooks, Nature trails have been laid out, a partial survey of plant and animal life has been made, and arboretums and green houses laid out. The park is the mecca for Wheeling adults and children, and all forms of education and diversion—camping, concerts, lectures, picnics, dramatics, horseback riding, and the usual outdoor sports—are enjoyed. West Virginia is fortunate in having Oglebay Park, and the Nation, since the beauty spot has become one of the centers for Nature study in the East, is benefitting from the gift made by Col. Oglebay.

Magazine on Amphibians

A worthwhile publication was born in February under the title of *Western Nature Study*. It is dedicated to the distribution of Nature information particularly useful to teachers and their students, and under the able direction of Gayle Pickwell, the editor, and Karl Hazeltine, the associate editor, it should have complete success. The first number, on toads, frogs and salamanders, contained material of unquestionably permanent value, and more recent editions have kept up the high standard set. We welcome, somewhat tardily, the new publication and wish it the support it undoubtedly deserves.

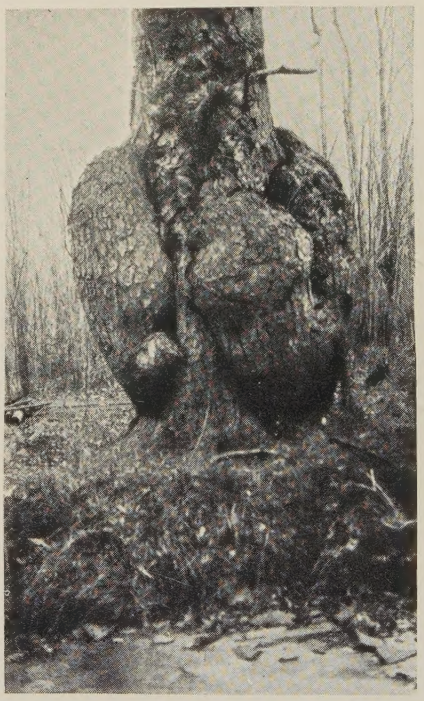
Albino Trout

Several times Nature Magazine has reported the existence, in different parts of the country, of albino trout. C. F. Gronemann, of Elgin, Illinois, discloses that in Interstate Park at St. Croix, Wisconsin, hundreds of white trout are being raised at the State Trout Hatchery. One of the many outdoor tanks contained albinos exclusively, and many more of different ages were in various tanks elsewhere.



A Fighting Elm

This elm, pictured above, by H. H. Bridgman of Piqua, Ohio, refused to be vanquished, and though blown over, due to loosening of its roots by water, it continued to grow with the main trunk on the ground. Two branches have been growing vertically, and sending out horizontal shoots. Gradually, the old trunk will decay, while the former limbs will become trunks, taking the place of the fallen member. Such persistence and vitality is unusual in blown-over trees.



Interesting Growth

Frank L. Barton of Endicott, New York, sends in the above interesting picture of a yellow birch that grows near that community. He writes that the greatest circumference of this growth is twenty feet and ten inches. It starts one foot eight inches from the ground and extends up to eight feet from the ground.

Nature Teaching

The National Council of Supervisors of Nature Study and Gardening has recently changed its title to the National Council for Supervisors of Elementary Science, and a new program is being worked out for the benefit of Nature and science teachers by the new officers elected at the last convention. Gerald S. Craig of Columbia University is president, James M. McArthur of New Orleans Normal School, vice-president, and Helen Dolman, Michigan State Normal College, Ypsilanti, Michigan, was made secretary-treasurer.

Bird Booths

Bird Booths at County Fairs comprise one of the latest methods for conveying bird information to the public at large. They have been used at the county fair at Mineola, N. Y. for the past four years by the Bird Club of Long Island in conjunction with the National Association of Audubon Societies, writes Miss Katherine S. Harrington of Hempstead, New York. The booths are decorated to suggest the out-of-doors, and in them are hung bird charts, bird houses, abandoned birds' nests, photographs and model bird baths and feeding stations. On the front counters, conservation literature is prominently displayed, and popular bird books are for sale. It is significant that thousands of questions are asked the attendants at the booths on bird protection, winter feeding, control of bird enemies, and the placing of bird houses. Friends are made who later become members of the clubs. Miss Harrington suggests that bird booths as a part of each county fair would do a large amount of good and create intense interest, as in the case of the Mineola Fair.

Red Snow

Visitors to Glacier Park may remember seeing red snow along the mountain summits, and find that when they walked in it, crimson tracks were left. The cause of this, as explained by G. C. Ruhle, the Park Naturalist in *Glacier Park Nature Notes*, is a brilliantly colored one-celled alga known as *Protococcus nivalis*, which multiplies rapidly among the drifts, giving them their color. Occasionally the snow following vigorous dust storms will be colored, but in such cases the cause is the intermingling of dust and the snow.

Maine and Billboards

The Maine Federation of Women's Clubs are out after the billboards. Recently a short, carefully written bulletin was sent to members, asking them to protest against the erection, at entrances to cities and towns, of large billboards bearing a "welcome" sign in the name of service clubs. They were asked to encourage tree and shrub planting along roadsides, and to organize a patrol to keep roadsides clean. If the billboard organizations will remember the passage of the nineteenth amendment and woman's part in the establishment of the eighteenth, they may be able to notice handwriting on the wall. The Maine Clubs are only keeping abreast of the times.

More Than Expected

The pupils of Wendell Lamp, assistant principal in the Clay Township schools at Bunker Hill, Indiana, got more than they bargained for when they collected a certain water snake and put her in a jar in their laboratory, for the snake, one night when no one was present, brought 19 little snakes into the world in the privacy of a half-opened drawer to which she had gone after escaping from her jar. The babies averaged six and one half inches in length and weighed three grams each. They were identified by Carl Schmidt, curator of reptiles at the Chicago Field Museum as *Natrix sipedon sipedon*, members of a common species.

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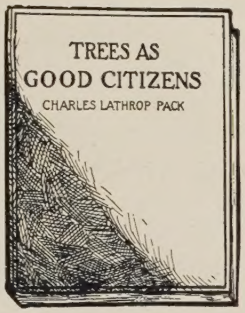

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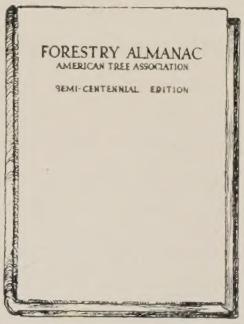

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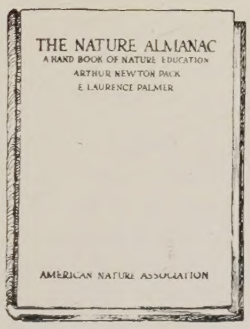

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NATURE MAGAZINE is published monthly by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C. Additional entry at Greenwich, Conn.

Publication and Editorial Office, 1214 16th Street, N. W. Washington, D. C. Additional Offices of Publication, Greenwich, Conn.

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OUTDOOR ADVERTISING

An Editorial

NO CIVILIZED country—or uncivilized, for that matter—is the victim of outdoor advertising to any degree comparable to the United States. This may be either because the other countries have had their landscapes long enough really to appreciate them, or because we are lacking in ability to appreciate ours. Actually neither of these surmises can claim more strength than is usual with generalities.

Let us briefly consider the history of this industry. Three decades ago billboard advertising had two types of location. One was urban, the other along the routes of railroads. The automobile was in its infancy. Highway travel was infinitesimal compared with today. There was no reason for the rural billboard.

In these thirty years, however, the automobile has changed from a luxury to almost a necessity. It has demanded good roads and the public has willingly paid taxes to build these roads that they might ride in comfort. Millions of dollars have been and are being converted into cement and asphalt. The American people are going places and seeing things in gasoline-driven vehicles to an extent incomprehensible in most other parts of the world. By virtue of the automobile and the public's millions, then, the rural countryside has become a choice site for the billboard.

Americans rarely do things by halves. When they go into wars, play games, build highways, or develop industry they "go the whole hog". The outdoor advertising industry is no exception. They went a whole pig-sty full of hogs and took over the rural countryside wherever the public investment had made it profitable to do so and the property owner was callous, indifferent or mercenary in a petty way.

The brewers and distillers once took over every profitable corner for a saloon. The American people, running true to form, wiped them out with national prohibition.

The "organized" outdoor advertising industry, being possessed of more intelligence than the liquor industry, saw the handwriting and, in 1925, adopted a set of standards. So far as the physical character and construction of boards erected by companies in the organized industry are concerned, the standards have been a help. So far as consideration of the public's desire to travel through the rural countryside and, at the same time, get some esthetic enjoyment out of it is concerned, the standards have done nothing to improve conditions.

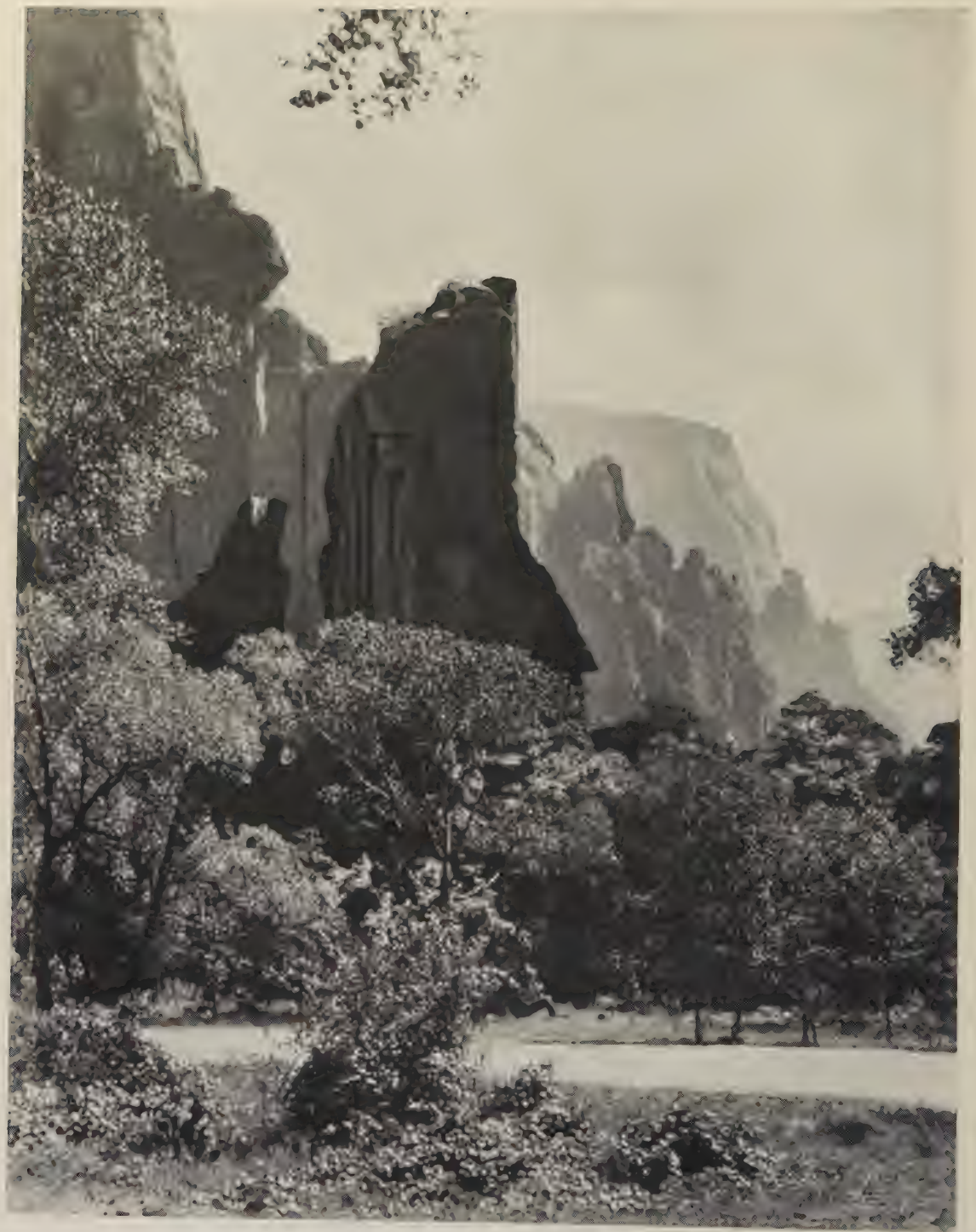
It is only natural that the outdoor advertiser in selecting a billboard site is interested principally in its strategic position as an attention-catcher. That it be on a curve where the attention of the driver should be on the road; that it be near an underpass where no distraction should be permitted; that it be against a background of a charming piece of countryside, are immaterial. The industry professes its willingness to remove boards to which any "reasonably-minded person" could object. But the industry must judge whether one is "reasonably-minded" or not. It's a packed jury.

There are, to be sure, thousands of snipe signs tacked on trees and fence posts or erected by some local carpenter. Over these the organized industry has no control. Indeed, it is happy to make a grand gesture in condemning them and even helping to remove them. Why not?—they are competitive advertising. Every state, however, can easily legislate to remove these parasites from the right of way and public sentiment can help to keep them off the contiguous private property.

The organized industry presents a different problem. It has money to support lobbies against legislation, or to hire expensive lawyers to delay the inevitable, as in the pending Massachusetts case. It can be reached only by public sentiment, and by legislation, the constitutionality of which will soon be established. It is already feeling the effects of the public mind, and is obstructing constructive legislation by every means in its power.

All of these facts are substantiated by the several state surveys conducted by the National Council for Protection of Roadside Beauty, with the cooperation and support of the American Nature Association. These investigations have been thorough. They have demonstrated that esthetic values have little weight with the organized industry; that considerations of safety at intersections, curves, and crossings are generally ignored; that billboards and signs plaster highways in proportion to the excellence of the highway and its coincidental cost to the public, and that public sentiment is reaching the point of conflagration.

The outdoor advertising business would do well to read history and realize that the American people, when thoroughly angry, enthusiastic or aroused, "go the whole hog" in remedying things.



THE TEMPLE OF SINAWARA IN ZION NATIONAL PARK

Here are found both grandeur and beauty in such degree as to entrance the observer

NATURE MAGAZINE
VOLUME 16 JULY · 1930 NUMBER 1

BIRMINGHAM No. 23 G. P. L.

THE HALLS OF ZION

WHERE RICH AND FANTASTIC BEAUTY REIGNS

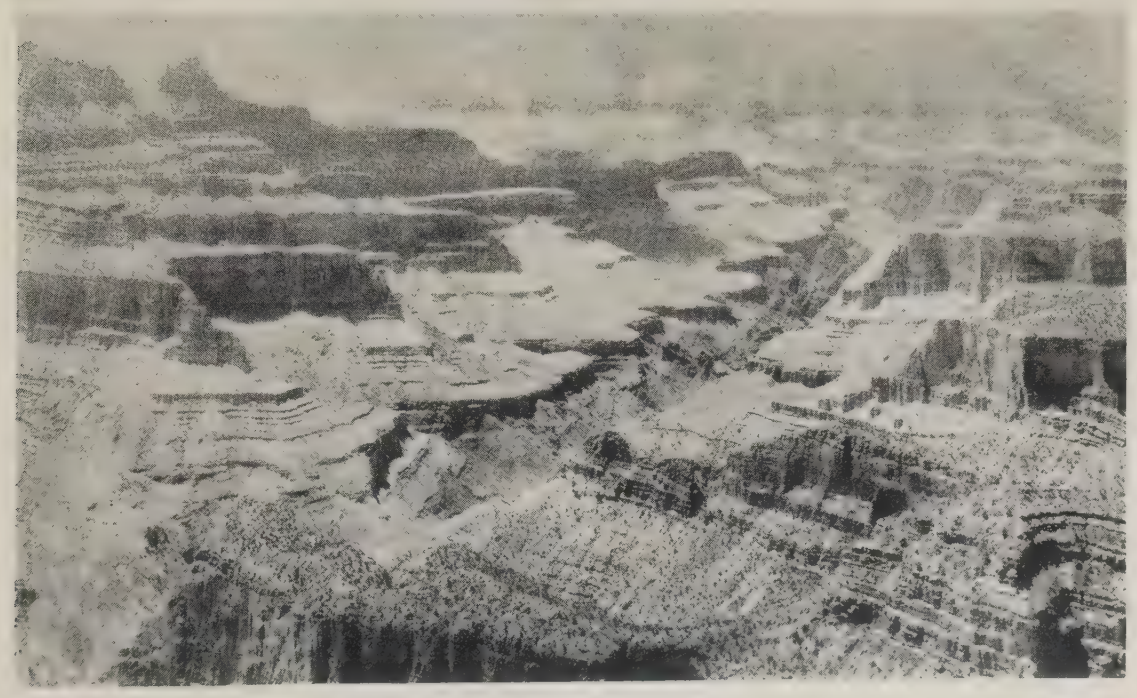
BY ARTHUR NEWTON PACK

PHOTOGRAPHS COURTESY UNION PACIFIC RAILROAD

JACOB'S LAKE in the Kaibab National Forest lies in extreme northern Arizona. All that portion of the state north of the Grand Canyon of the Colorado seems from the map to belong more logically to Utah than to Arizona. Indeed, but a few years ago Utah might have had it as a gift for all that most Arizonians cared. There was practically no satisfactory way to get there, except by crossing the Canyon on muleback or by a circle of nearly a thousand miles roundabout. To be sure, there was Lee's Ferry just above the Canyon proper, but the road and the crossing were both hazardous. Then came the construction of the new bridge over the Colorado and Arizona awoke to an interest in its northern appendage.

As we drove northward from Jacob's Lake, the road switched rapidly downward, leaving the pines behind, but with gorgeous views from the high mesa we were following—views looking out over the valley and desert country, where colors vie with each other in soft brilliance. The mesa was then behind us, and our road followed straight as an arrow across the sage flats. The little Mormon town of Fredonia, Arizona, with its poplar trees lining the streets, lay ahead. Its roadways were wide, and deep with mud, except at the edges. We kept straight on, because Kanab was only a few miles away, and we had crossed the line into Utah.

Kanab is much like Fredonia—a Mormon town with a church, from which on this particular Sunday issued the sounds of an organ and then the droning voice of a preacher. We pushed on northward, encountering mud-



HERE WE HAVE ONLY ONE OF THE MANY GRAND CANYON VIEWS
Looking at the great gorge from the eminence of Bright Angel Point on the north rim

THE MINARETS THAT BELONG TO BRYCE CANYON
At first view they are almost ludicrous in their fantasy, but they invite visits and study

holes and signs of a heavy rain, and entered the canyon of the Virgin River. Up and down the road led, now between junipers, now among pines, now down again. Late in the afternoon we passed a fork in the road where the sign proclaimed that one might go westward to Cedar Breaks and Cedar City, or keep on north, swinging eventually eastward, to Bryce. We purchased gasoline and chose the northward road, winding down along a creek that had recently been in flood and evidently had covered the road in places. On our left we had glimpses of spectacular erosion, such as we expected Bryce Canyon would be like. We were high now, having reached eight thousand feet at the gas station. Passing the little town of Hatch, Utah, we kept on a few miles more northward and then encountered the fork to Bryce Canyon. This was a good road—better than that we had traveled. It climbed steadily. We passed through Red Rock Canyon, where strangely eroded statues greeted us on either side. Abruptly the road tunneled through the sandstone. It was growing late. We reached for overcoats and extra jackets. Then, just at dusk, we swung into view of an attractive, low-built lodge constructed of rock and logs, with many outlying cabins. We passed it by and kept on to the edge of Bryce Canyon itself, slid out of the cars, and ran quickly over to the edge.

Beneath us spread a great, washed-out mountainside bristling with great cracks and millions of grotesque red and yellow turrets. The colors seemed impossible; the shapes absurd. The whole thing seemed utterly incomprehensible, ludicrous, and yet tremendous. Our emotions struggled for expression in laughter, and we shouted. At last we turned and drove back to the hotel.

We were not awake to see the sun rise over Bryce Canyon, as we felt we had seen a great many sunrises lately, and that even a sunrise over Bryce could not be as good as the sunset. It seldom is in this country, for the wonderful coloring is generally lacking. We spent about an hour or more on the edge of the Canyon, walking out to various observation points and taking pictures, although I feared that the pictures would be rather disappointing, as color is the chief note here. Our second look was under saner circumstances, and the million formations seemed less purely ludicrous and more worthy of study. Indeed, we might have stayed longer and enjoyed the peculiar attractions of this strange place, were it not that we were so far behind the schedule necessary to complete our trip.

We left Bryce and retraced our road to the gas station, then turned directly westward up a long steady grade. We climbed above the pines into the white concolor firs, the blue and Engleman spruces. The scenery resembled the high forests of Glacier National Park. We looked down on a beautiful lake and climbed still higher. We came out in alpine meadows, bordered by deep blue spruce trees, tall, thin, and straight. Snow lay in their shadows; and, as we climbed, snow sugared the drooping branches. There were alpine firs, too. How almost inconceivable it seemed that but a day or two ago we were in the hot desert country!

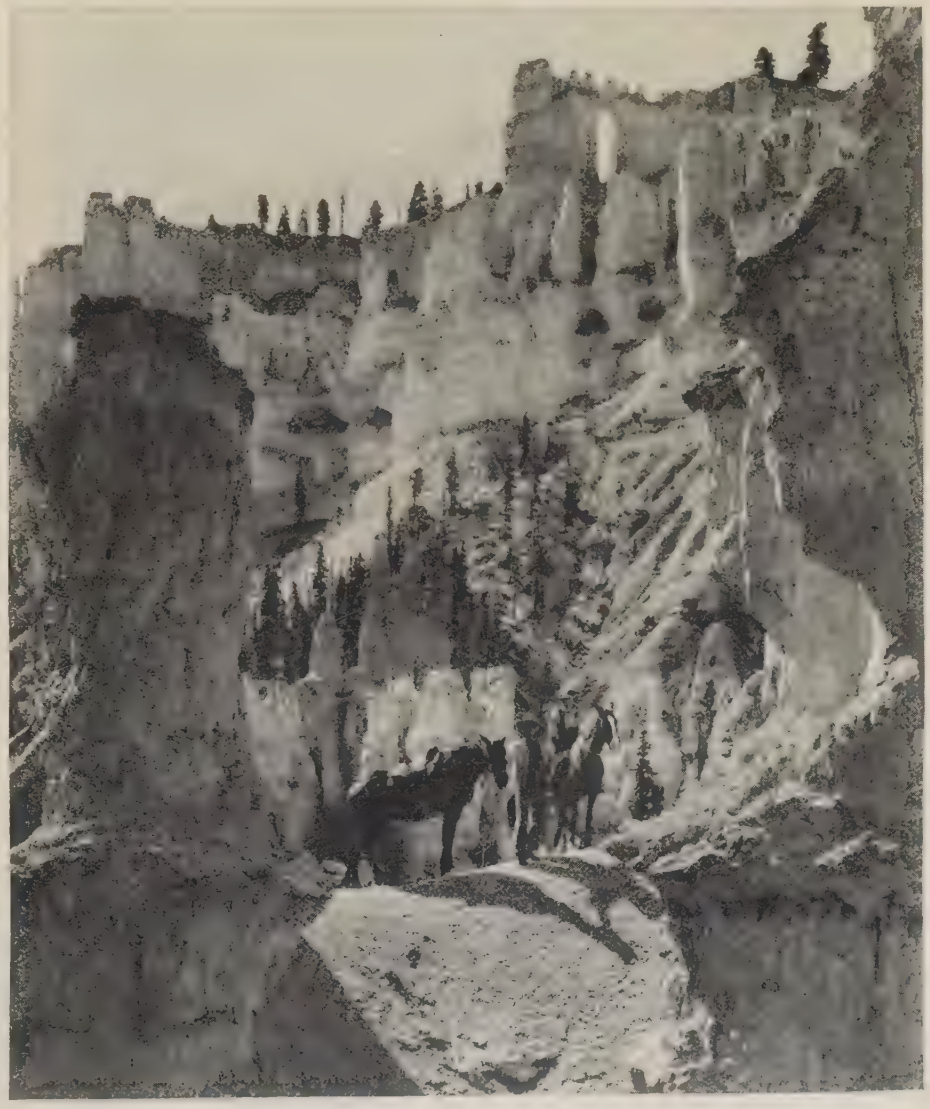
At an elevation of about ten thousand feet a road branched off to the northward again, climbing for a short distance to the edge of Cedar Breaks. There was snow in patches all about us now, and that cold, raw feeling in the air. Abruptly the road paused upon an awful brink where two or three other machines were already parked. From an elevation of almost eleven thousand feet this

whole northern side of the mountain broke away to the low sagebrush country of central Utah—broke away in one magnificent gesture to reveal the bare clayey soil and sandstone, colored red and gold and white, carved into strange formations, not nearly as queer as at Bryce, but on a broader scale. Dark blue spruce trees cast their shadows upon the snow which topped the very brink of the chasm. The next tree below—probably marked by one of those tiny dots—was a scraggly green juniper six thousand feet down. There is no possible way to compare one of these strange places with another. One can not say "This is like the Grand Canyon" or "This is like Montana." Each is itself a marvel beyond compare.

At last we turned and drove on, back to the main east and west road. Suddenly a warning sign confronted us, "Narrow road and long steep grade ahead. Drive in low gear!" It *was* a long grade and a steep grade, especially for such a main traveled road. On it we descended mile by mile, passing again through the various life zones so wonderfully illustrated in this southwestern country. In due time we caught up to a big Union Pacific bus full of tourists who had left Bryce Canyon before us in the morning. The bus was stalled on the narrow road, by coming face to face with a heavily-loaded truck which could not make the grade. There was just room for our two Fords to scoot around the edge, weave in between the cars, and pass.

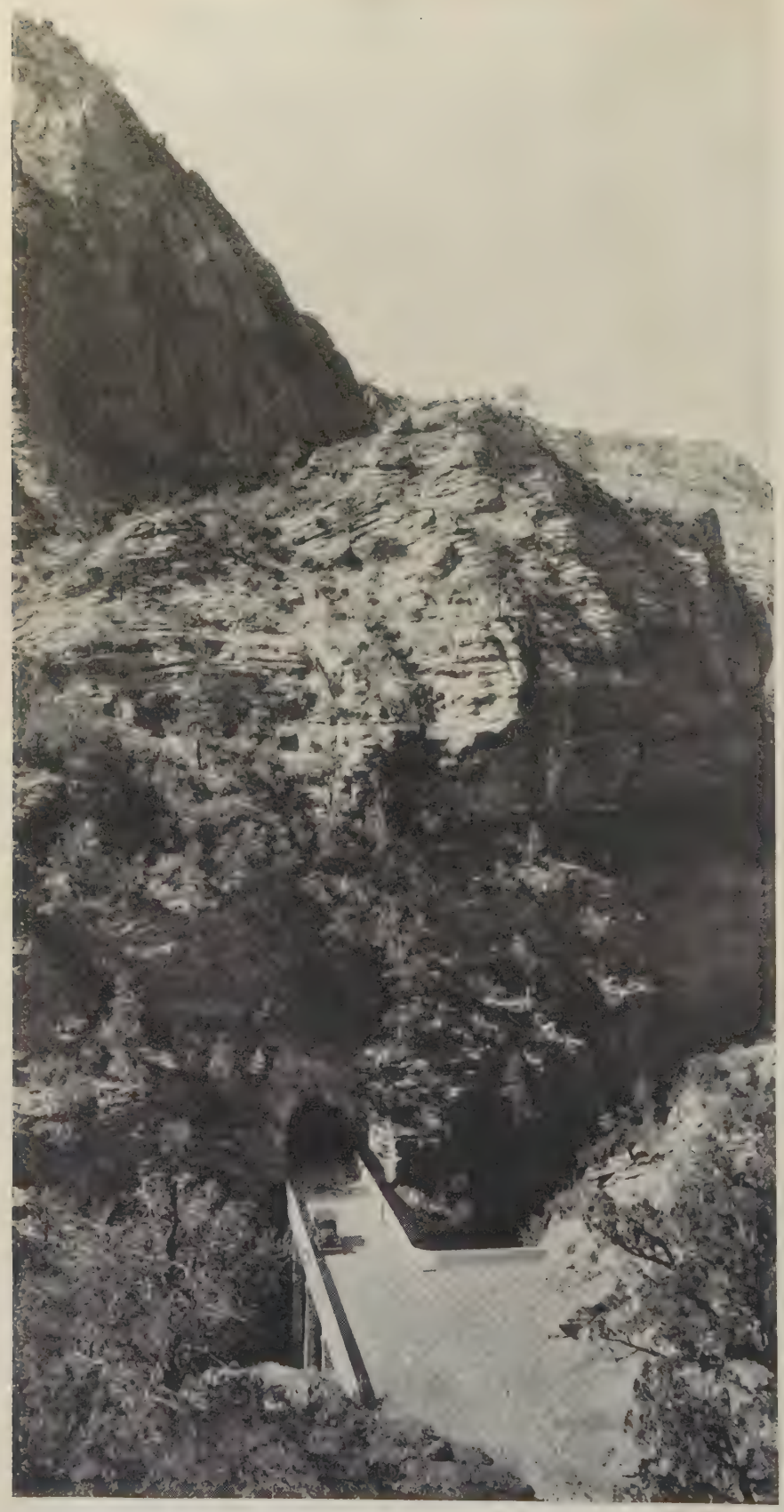
Words fail in any attempt to describe one scenic road after another. This one entered a narrow and deep canyon, and to persons less inured to spectacular going it must have been a tremendous thrill. We were in a state of mind where it was hardly possible to absorb more of beauty and excitement. Suffice it to say that in due course we came to Cedar City, down once more on the edge of the sagebrush desert.

From Cedar City the distance to Zion National Park is over sixty miles, and the roads, on the whole, are good. We spun on southward. This is part of the main trail from Salt Lake City to Los Angeles, and boasts a macadamized surface for the first twenty miles. The sun was just setting as we came to a fork branching eastward toward Zion. Rapidly we climbed to the top of a high ridge in time to absorb the full beauty of the most gorgeous sunset we had ever witnessed. At the brightest spot in the red and orange sky rays of rainbow hue shot up far into the heavens, almost like the Northern Lights. We could not help stopping to watch that wonderful sight. There are no such sunsets anywhere else in America. Now we again followed the valley of the Virgin River eastward and upstream. The orange sky reflected in still pools beside us. It was hard to realize that common sense told us that we must push on or go supperless. Dusk came, and then darkness—moonlight. Ghostly cliffs and mountains of white sandstone, contrasting with the darker red rocks, rose above us. We flashed by two little villages of three or four houses each. Then on in the strange green moonlight. A gate and a little cabin by the roadside came into view, and we knew that this was the entrance to Zion National Park. We were in a deep narrow canyon—Zion Canyon itself, through which flows the upper waters of the Virgin River. We



ON THE TRAIL IN BRYCE CANYON NATIONAL PARK

Here is a land full to overflowing with a marvellous color and with fascinating formations



ALONG AMERICA'S MOST SCENIC HIGHWAY

Entering the 6200 foot tunnel on the new Mt. Carmel Highway between Zion and Bryce Parks

sped across bridges, with silvery water beneath. We glanced up at great greenish-white monoliths of rock. The Canyon closed in on us. Then there were lights—cabins—the hotel.

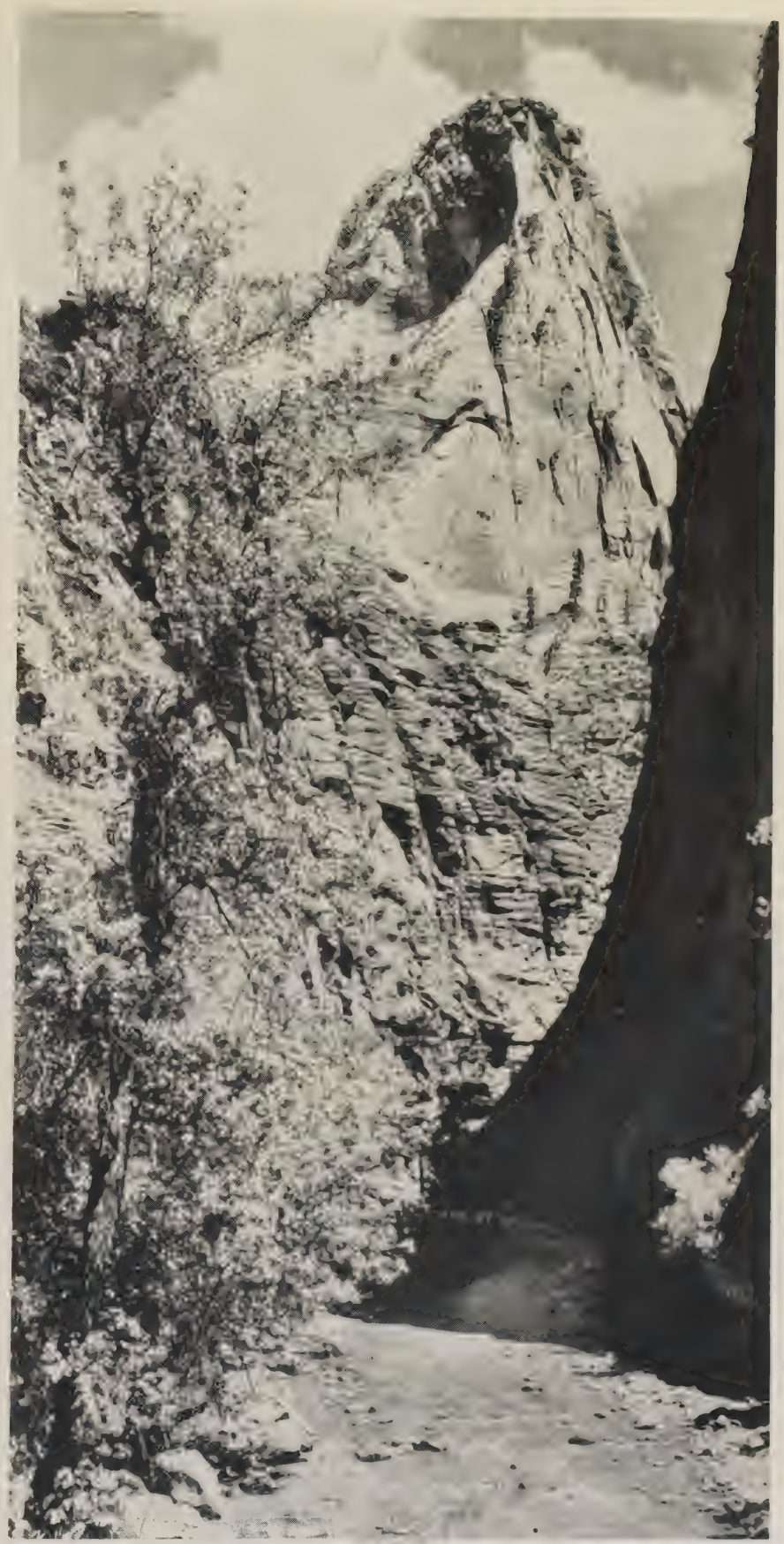
Next morning we drove four miles up the valley and then walked up a side trail to a great overhanging and dripping rock, where maidenhair ferns and mimulus, or monkey flower, grew. Then at the end of the road we enjoyed the most famous of the Zion Canyon views. Zion, with its lovely green aspen trees growing along the river bank, is certainly far more restfully beautiful than the Grand Canyon. A foot trail led on up the river until it also ended at a point where the Canyon was just wide enough to let the river through.

The red sandstone of Zion, overlaid with white, carries us back to a period of geological time following that of the rocks in the Grand Canyon proper. The sheer walls reaching up in vertical array three thousand feet above the Virgin River represent sedimentary deposits of the Age of Reptiles, when birds and mammals also made their initial appearance on earth, when palm trees and similar plants were first recorded. Geologists call this red rock "Vermilion Cliff" sandstone, and the white above it is the "White Cliff". These two rocks in unbelievably majestic proportions form the Temples of the Virgin, more beautiful and more splendid even than the greatest buttes in the Grand Canyon. Here, too, the gem-like vivid green of the cottonwoods along the stream adds a different note of rampant color. An early writer once remarked that in attempting description "we must be frugal of adjectives, lest we find their force and meaning exhausted." Indeed grandeur and beauty on such a scale left us helpless in a feeling of insignificance and obscurity, craving only specific action to free our minds and voices from some

mighty overwhelming load.

To climb! Ah, that is what we crave. But what days may be spent by a mere human ant at scaling those tremendous walls! Man was made to reach upward. What is more appropriate than all his engineering skill should have chosen this place for its demonstration! Crawling along ledges, suspended by ropes from above, dangling over space, the government engineers have worked for four swift years at carving out a road. Tiny holes bored in the rock, shattering blasts that seemed only puny puffs of smoke, lives risked in mid-air, and yet without one serious loss—these have all contributed to the serpentine upward growth of that smooth gravel ribbon. Shanties where men have pored over endless calculation columns, all the skill that brains create, have contrived the perfect meeting of tunnels leading nowhere until one day they joined, and through them the laboring trucks pushed higher still. This is the road that leads out of the Valley of Zion to the very heights. It may be justly said that there is no more scenic highway in America than the Zion-Mt. Carmel route—opened during the early winter of 1929.

The work was not yet complete on the day that we spent in Zion National Park, but Superintendent Scoyen, justly proud of his large share in the accomplishment, led us up that series of carefully-planned loops until it seemed that everything must end at one great vertical stone precipice. Not so. Instead, a tunnel gaped, and through its depths, just safely inside the mountain wall, where no landslide can destroy the pathway, we slowly drove. Now there was light again. A great gallery opened in the cliff, and in its portico was room to stop and look out upon the world. We looked and listened while Mr. Scoyen told of how he had once climbed to survey and photo-



THE MOUNTAIN OF MYSTERY IN ZION PARK

Inscrutable it rears its massive bulk above the gorge of the stream bordered with aspens

graph this route. Again and again we moved in darkness, and again light came. Here was the head of the creek we had once followed—a crevasse so narrow one might almost step across it. Our conductor dropped a stone. Back and forth it caromed, growing fainter and still fainter until abruptly it splashed into a hidden pool. Involuntarily we drew back from that dreadful parapet, so sure that we were safe, yet so fearful of that tremendous deep.

At last the tunnel ended and we found ourselves among the heights near the National Park boundary. Scraggly clusters of juniper dotted the white sandstone slopes like green trees above a snowy field. Yet there was no snow—only warm sunshine of late afternoon. The road climbed a little farther and to one looking backward that group of great monoliths which guard the Halls of Zion seemed to rise as if pushed by some gigantic elevator. Now to the eastward the finished highway began to slope down. Mr. Scoyen took his way back to headquarters and left us to slide smoothly and easily down toward the main north and south route.

We turned south back towards the Kaibab and Grand Canyon until a ridge again gave us a view of the setting sun. Camp was soon made, the last afterglow died away, and a silvery half-moon rose opposite to bring into bold relief the canyons and the black shadows of Utah junipers. There was time to rest about our last Utah camp.

WATCHING HER YOUNG

The mother swan just before delivering her infant from the egg

A MOTHER'S CARE

HOW A SWAN ATTENDS TO THE HATCHING OF HER YOUNG

BY JOHN S. KANSLER

FLOATING ON THE LAKE

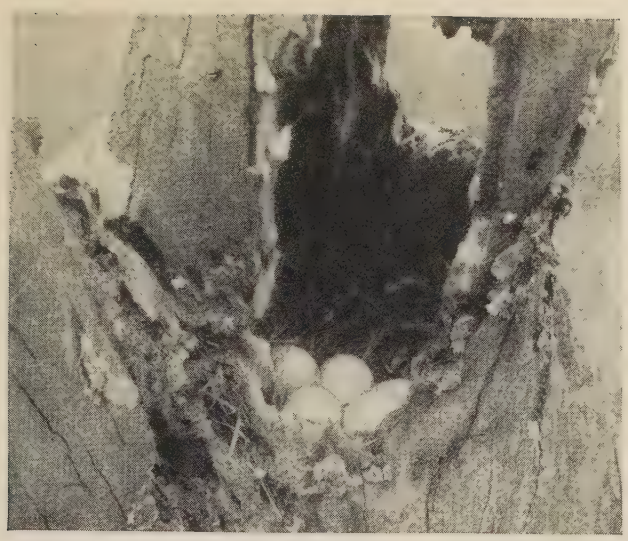
Some of the swans at Hagerstown

WHILE taking pictures in the city park at Hagerstown, Maryland, recently, I noticed one of the swans stand up in her nest, as I supposed to turn her eggs. She had four of them—all a muddy gray color; but there was one with white spots on the pointed end which I discovered were caused by the shell breaking. With her bill she broke the shell and skin away from half of the young bird, carefully putting the bits outside of the nest. The bird did not expand but retained the same shape as when enclosed in the shell. The mother worked gently with her bill until the head appeared, and then the neck, which was about an inch and a half long; then taking the head of the young bird in her beak she gave it a quick sudden jerk and pulled it entirely out of the butt end of the shell. After croaking a few words of affection to her baby she settled down on it to dry it off. This example of mother love furnished one of the most delightful experiences I have ever had.

IN THE CITY PARK AT HAGERSTOWN

A mother broods mid beautiful surroundings

The city park in which this episode occurred is rated by the Park International Magazine as the second most beautiful natural park in the States, the first one being at Cedar Rapids, Iowa. At present seventeen adult swans, a pair of Chinese geese, and Muscovy and mandarin ducks, a Toulouse goose, and some Canada geese live there. Wild fowl frequently alight on the large lake in the migratory season. All in all, a most popular place.



PROSPECTIVE BLUEBIRDS AT HOME
The author stood on his brother's shoulders to find out how they lived

A LOW BUSH BEARS A BURDEN
Quite accessible to photographers are the chestnut-sided warbler's nest and eggs

NEST-HUNTING WITH A CAMERA

IT GIVES THRILLS COLLECTING NEVER HAD

BY L. W. BROWNELL

PHOTOGRAPHS BY THE AUTHOR

It has been many years since, as a boy, I made my collection of birds' eggs. As a scientific collection it was hardly a success. Many of the eggs were unnamed and more were misnamed. Only one or two had been taken from each nest, as I had labored under the impression that thus the old birds would never know that their nests had been disturbed. But with all its inaccuracy and incompleteness, I got a thrill from it—until I learned of bigger thrills.

Later, I made another and more scientific collection—one of nests with full clutches of eggs of each species, in series with complete data accompanying each "set". At this time I had learned that in no other way could a scientifically correct collection be made and had come to believe that a mother bird would refuse to return to a nest from which even one of the eggs had been removed. Now I got greater pleasure from finding a nest of some species not represented in my collection than I had ever experienced during amateur days. Of course, I never stopped to think that the birds' rights to their nest and eggs were infinitely greater than mine, and that, with each nest I took, I was depriving the world of just so many potential aids in the eternal war against the insect menace.

Now, however—and for a considerable number of years—I have been nest hunting with a camera. My really valuable collection of eggs has been disposed of, and I can truthfully say that the thrill of searching for and discovering new and good subjects to photograph is still even greater than that which I obtained by robbing the parent birds of their home and eggs. For now I have the added satisfaction of knowing that, when I have found, photographed and left a nest in exactly the same condition in which I found it, as is my invariable practice, the mother bird will return to resume her interrupted duties of bringing forth her young and no harm will have been done.

IN BANKS LIE SECURITY
At least the bank swallow so believes. The tunnel was cut to show the nest

Although nest photography is one of the easier branches of

THE HOUSE WREN'S TREASURES

One must get light at a proper angle for results

Nature camera work it has sufficient difficulty, especially in the case of the tree breeding species, to make even the most sophisticated enthusiastic. The picture of a bird's nest, in order to have any real scientific value, must show enough to give a fairly accurate impression of the general surroundings in which it is built. It must also be taken at such an angle as to reveal the outside and a part of the inside construction and at least some, if not all, of the eggs. I am very greatly against pointing the camera directly downward at a nest, however, as I consider that it gives an entirely false idea of it and shows but little of the outside architecture.

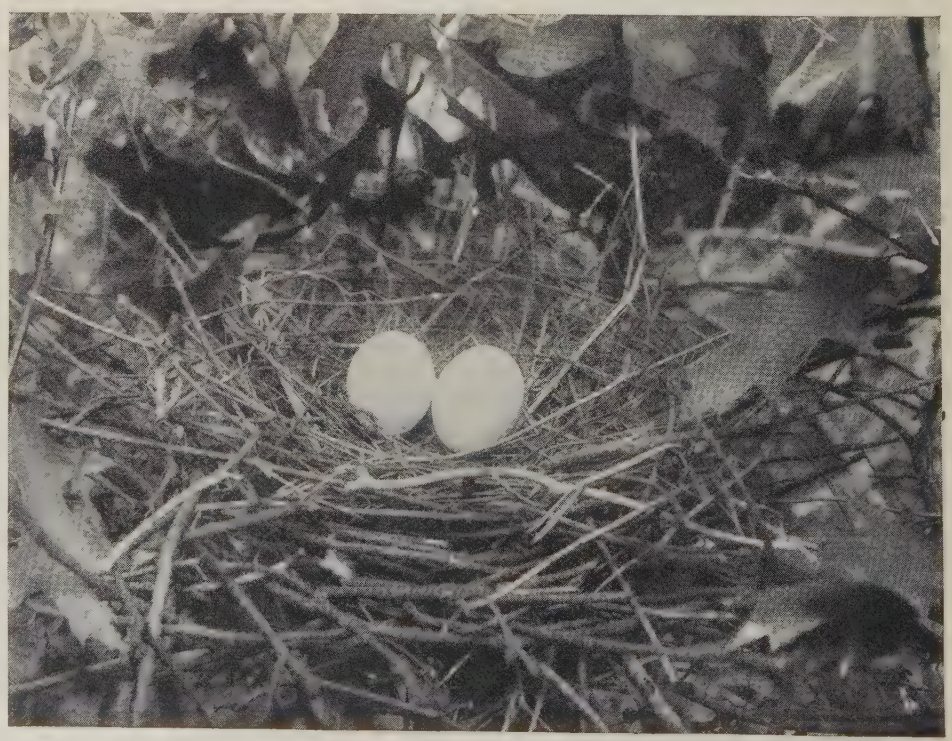
With almost any nest it will be found necessary to rearrange the surroundings to a certain extent. The leaves, grasses or small twigs which will almost invariably get in the way of the camera must be pressed aside or, possibly, cut off in order to obtain an entirely clear view. Yet a good photographer has to make sure that the natural surroundings are little affected and that cut twigs or down-pressed grass do not show in the picture. It is always advisable, when possible, to bend back the branches or herbage rather than to cut them off or pull them up, as they will easily spring back to their original positions after the photograph has been made.

Naturally the nests easiest to take are those that are built in low bushes from two to four feet above the ground. The most difficult are those built in trees, and swung at the end of a branch, as is the Baltimore oriole's home. A ball and socket clamp, now on the market at any photographic store, is a great aid in picturing the high dwellers. With it the camera can be clamped to any limb or branch and pointed in the desired direction. Occasionally, however, it is found necessary to lash the tripod to the tree to get the proper angle or view.

With those nests placed at the ends of branches one must wait until he finds one hung on a limb so low that it may be bent down until the home is brought within photographing distance of the ground. Of course one can always lengthen the legs of his tripod by lashing sticks to them, thus enabling him to use his camera at a greater height. I once photographed the nest and eggs of a bluebird that was situated twelve feet above the ground, and stood upon my brother's shoulders in order to focus.

In all cases the use of the tripod tilting top will be found advisable, for with it the camera may be pointed downward at the nest at the angle best suited to show both the outer and inner construction. It is well also to shade the nest, if it is not already in shadow, as the direct sunlight causes too great a contrast of lighting, making hard shadows in which little or no detail can be seen.

There are, of course, occasions when the nesting site must be destroyed in order to obtain the picture at all. The underground burrows of the bank swallow and kingfisher must be opened to show the nest and eggs and it



IN AN AWKWARD PLACE TO PHOTOGRAPH

Ten feet up in an oak sapling the camera with lengthened tripod legs saw a mourning dove's apartment

is obviously impossible to rearrange them in their original condition. The holes of the woodpeckers, nuthatches, and others, in the dead limbs or trunks of trees, likewise must also be opened. The least harm can be done in these cases, however, by cutting through the woody wall of the hole into the nest cavity with a sharp knife or key-hole saw, making a square opening that discloses the eggs. This leaves the entrance hole intact and both it and the eggs can be included in the photograph. If the cutting is carefully done, the piece removed can be replaced and fastened into position and the old bird will generally return to the nest.

The fact that one has, at some previous time, been a field collector and has learned just where, when and how to find the nest of the various species of birds is, naturally, a great aid when hunting them for photographic purposes. Each species of bird is peculiar to itself in respect to its nesting habits and one must be well acquainted with these habits before he can hunt their nests with any very great degree of success.

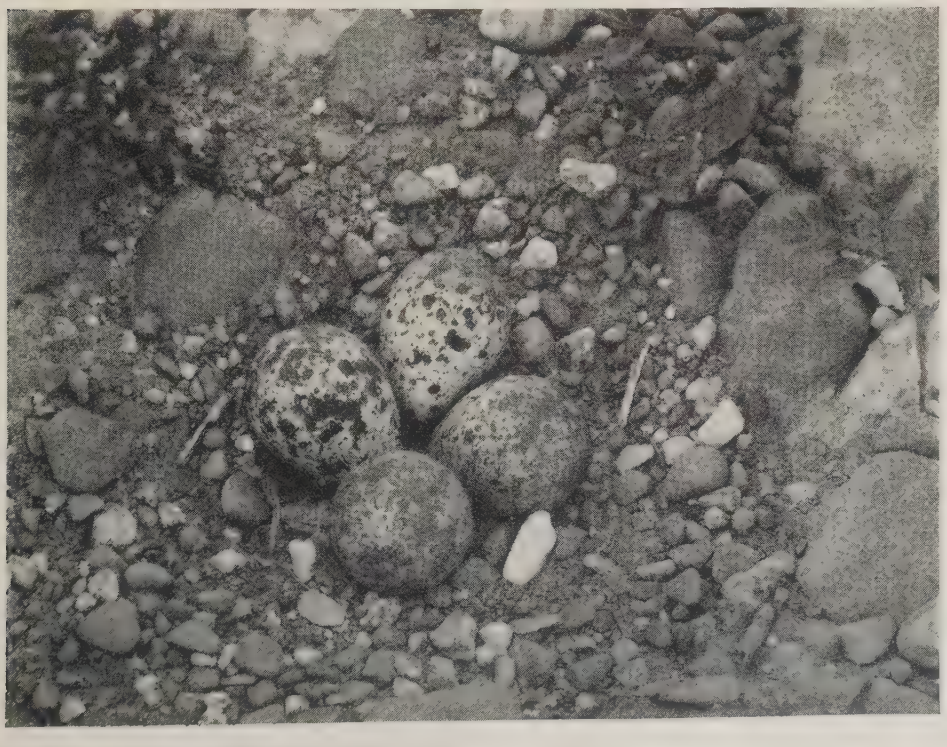
I proved this fact to my own satisfaction one day when a bird almost exhausted all the resources at my command before I found her eggs. I was passing a piece of bare, sandy and stony ground that had lately been cleared of a dense growth of bushes and saplings, filled in and partially leveled with the ultimate destiny of being cut up into building lots, when I heard the unmistakable note of the killdeer. Now the killdeer, a member of the plover family, while being quite common in some parts of its range, is but a rare visitant in the vicinity of my home and I had never before known it to breed there. Neither had I ever had the opportunity of photographing either it or its nest. Naturally my interest was at once aroused

A TYPE EASY TO PHOTOGRAPH

The snug nest of Wilson's thrush offers no trouble

for, while I doubted that there was a nest, still this piece of ground was a good place for a site and the chance that it might be there was well worth investigating. Presently the note was repeated. I heard it a third time. Moreover, there seemed to be in it a touch of anxiety such as I had heard many times in the voicing of a sandpiper whose home or offspring were being disturbed. This, to me, was a clear intimation that her eggs were near and I determined to find them.

The killdeer builds no real nest but lays its three or four eggs upon the bare ground, depending upon their protective coloring for their safety. That this dependence is not misplaced is evidenced by the fact that it is almost an impossibility to distinguish them from their surroundings at a distance of more than a few feet. I realized that my chances of finding these particular eggs by searching the ground for them was remote and that my only hope lay in having the bird, herself, show them to me. This, of course, she would not do if she could help herself. Moreover, I had been unable as yet to locate her although her notes reached me at regular intervals. Her cries had such ventriloquistic qualities that it



THEY TAKE WELL—BUT TRY TO FIND THEM!

Only after four hours of "watchful waiting" did the author discover these well-concealed killdeer eggs

was impossible to determine the direction from which they came.

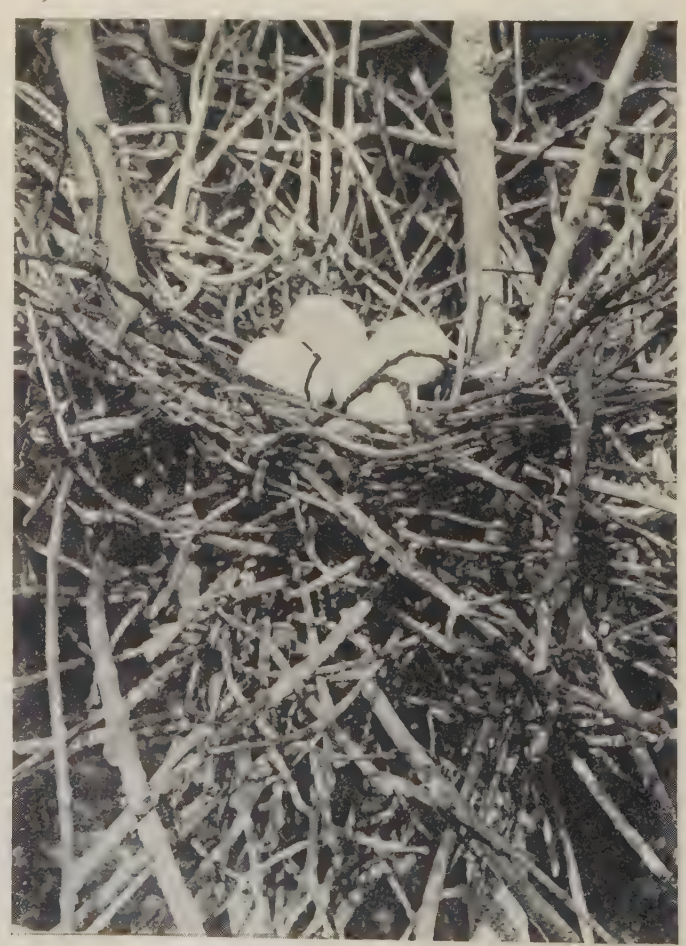
My first care was to find a place in which to hide and this presented itself to me in the shape of a small, thick clump of bushes not far from where I was standing. I was soon lying flat in the thickest part of them and starting a systematic search, with my eyes, of the bare piece of ground. For fifteen or twenty minutes I carefully eyed every foot of this stretch but without success. Not until I had started to go over it a second time did I catch a slight movement on the farther edge, nearly one hundred yards from where I lay. I was not then certain that I had picked up the object of my search and I had to watch that spot intently for five minutes before I made sure that I had spotted my bird. Finally I saw her run for a short distance along the ground before stopping absolutely still again. The moment that she stopped she was as absolutely lost as if she had never been there.

I knew from experience with other members of her family that I was in for a long and tedious virgil before she would approach her nest. I was not disappointed. For more than two hours and a half I never let my eyes leave the bird or the spot where I had last seen her for a single second, and if one thinks that this is an easy thing to do I suggest a trial sometime. During that period she wandered over nearly the entire area of bare space in such an apparently aimless fashion that she would undoubtedly have fooled anyone not well versed in her ways. This apparent nonchalance, however, was studied upon her part, I knew. Her wanderings were gradually bringing her closer to her nest. She could not stay away from the eggs much longer.

A SPOTTED SANDPIPER ABODE

It is found among the grass on the river bank or lake shore

Finally, when I feared that I could not stand the strain much longer, I lost sight of her in a slight hollow from which, although I waited fully fifteen minutes, she did not reappear. I considered this proof that she had reached her nest. But nothing was there when I arrived! As I started to move away from the spot, however, I nearly stepped on the eggs where they lay some eight feet from the place in which I expected to find them. The feeling of elation which then came over me was not all for the new photograph which I would soon add to my collection. My knowledge of the ways of a bird had been vindicated. Moreover, I had discovered the nest in the only way possible after watching the bird longer than most people would care to stick it out.



A HOME AMONG THE TREE TOPS

A black-crowned night heron placed her elaborate nest forty-five feet above the ground

This experience is but one of many that I have had since I left my collecting days behind me and sallied forth with camera and tripod. The old days, when I was a youngster and my amateur collection meant the world to me were wonderful, and the joys of my later scientific collection were manifold. Yet now, when I am hunting nests of rare species or lying in wait for the proper moment to photograph a nest, I get the greatest thrill of all.

A DOG'S DAY

A GLIMPSE AT THE WANDERINGS OF TWO DOGS

BY PAUL GRISWOLD HOWES

ILLUSTRATED BY GARNET JEX

RODA

EIGHT years have passed since Roda spent her first puppy night, curled up like a hibernating mouse beside my bed. In those eight years she has learned much of the world, and like all Airedales of my acquaintance, has become something of a dog bum.

At eight, she is a bit gray, and past the middle-age of dogs. She is mellow and wise and the mother of many children. Grant that she is past her physical prime; mentally she is merely mature. She is at that period of life when I like my dogs best. It is in these waning years of life that an Airedale will doze happily in the morning sunlight and with half closed, dreamy eyes, feast them upon the master or mistress that she has learned to love.

My eyes will keep Roda's tail a'wag as long as I look in her direction. If I speak there comes a still sweeter thing—the sweetest, perhaps, in all dogdom. It is the ruffled upper lip and wrinkled nose of the Airedale smile. When she smiles she rises for the occasion. She shakes her woolly head from side to side, snorts through her nose and displays her all but empty gums.

Roda is much like a human being and her moods change with the weather and temperature. If it be a drizzling gloomy day in June, when we all feel that it should be bright and sunny and the trees filled with singing birds, Roda is as melancholy as I. As usual, she goes out upon the porch as soon as I am up, and here she sits to consider the thing. She is all hunched up and her tail does not wag. Over her features there is a discouraged look and all the world seems dreary and deserted. Nothing interests her, and at length a comfortable spot under the living room table is chosen for the remainder of the day.

On a bright morning things are quite different. Roda lies in the sun for a while, shifting her position as the warm spot moves across the porch. Finally it reaches the path below the steps and the red and black bricks beyond. This is her alarm clock, and it is time to be off when the sun reaches the path—off to morning adventure.

She sits up erect and tense. The air is full of good messages, and she sniffs it, first to the right, now to the left, and again with her head tilted straight to the sky. Her ears are cocked and she is oblivious to all but dog thoughts.

In a few minutes comes decision and off she trots with her mind most definitely made up. I will not see her again until after dinner at night, when she will return, wreathed in smiles, snorting and wriggling her body; covered with dirt and mud and burs and all the joyous marks of a day spent in the great open spaces of dogdom.

These daily jaunts on bright days set me to wondering. My curiosity was aroused and grew each day until I decided to follow her secretly if such were possible. So one day I laid plans and ran my car from the garage to a spot where I could watch the front gate without arousing her suspicions. I knew that should Roda catch a glimpse of me apparently making ready to accompany her to the woods, her instant and unrepressed joy at the possibility would have driven all other more doggy ideas from her head.

I had not long to wait. Soon she walked to the end of the path and sat down upon her haunches to sniff the various interesting news items of the day. My car was pointing north, and from that point of the compass something was being broadcasted upon the wind that appealed greatly to my dog. She sniffed the air exactly as she does in the kitchen when something good has been left standing upon the table. A pleased expression overran her face and before long she was up and off towards the north.

Now directly north of Roda's house, but quite some distance off, are two others. One is big and rich-looking and belongs to a fat fellow named Sport, whose father was a Bull Terrier and whose mother was a Collie. Sport is fat and lazy and terribly over-fed. The other house is nameless to Roda because no dog lives there at present, but both of these places have garbage cans that are not only well stocked with dainty morsels, but also easy to open.

Sport guards his very well, and it may only be pillaged when he is away on other business. This Roda certainly knows. She trotted off down the road to the big house, tail between her legs, and cautiously peered through the lattice which screens the kitchen door from the road. In the sun, near the coveted can slept Sport in all his pudgy self-satisfied glory. Roda was a picture. If ever a dog expressed disgust in her face here it was. She stared with a pitiful fixity, sniffing that delicious thing again and again, so near and yet so far away, with that fat Sport spoiling all her plans. Well, there was nothing to do but take the next best thing. Turning from the gate, she trotted across the road to the little bungalow with its unprotected back door and its welcoming, unguarded offerings.

IT WAS A COMBAT OF COURAGE AND ENDURANCE

With her nose, she neatly lifted the cover of the can and then plunged her whole face into the grab bag of egg shells, coffee grounds, lettuce and tin. In a minute she hauled out her favorite delicacy, a condensed milk tin with some of the delicious stuff still to be had by a long and patient tongue.

Here was compensation for her other disappointment. Sport's family, being proud and rich, never descended to the use of condensed milk. For the first time that morning Roda's tail was erect. She had forgotten Sport and all her troubles in this saccharine delight.

Having explored this garbage can to her satisfaction, Roda now set off to the north again and I followed at a safe distance in my car. She walked straight up the road which leads over a hill to some other houses, and here as if by appointment, she met another rather nondescript male Airedale. There was no emotion on Roda's part, but the dog was undoubtedly delighted, for he commenced tearing about his lady friend, kicking up the dirt and barking, crossing and recrossing her path, tail down, legs wide flung, tearing about in a most ridiculous manner. Roda soon lost her dignity also. The hilarity of this thing was too great for resistance and for a time the two raced about in thoroughly delicious and exhausting abandon.

In the midst of this tearing, dodging and dust-raising procedure, a fat and bewildered hop-toad was rudely thrown from his warm retreat at the edge of the roadway. He rolled over, blinking his great startled eyes. After one energetic kick with all four legs, he settled in the face of so sudden a danger, after the manner of hop-toads, as one that had departed this earth.

The toad's one frightened kick had betrayed his presence however, and instantly the game of tag had ceased between the dogs. Roda, being mellow and wise, simply looked on as if to enjoy what was sure to follow, for her companion was young and foolish and as yet little versed in the ways of the world. The toad had moved and the dog had seen it—of that he was certain; and although the batrachian now remained perfectly motionless and therefore invisible, the thing simply had to be investigated.

Roda knows very well that toads employ two methods of defence. The first of these is to remain motionless feigning death, and the second one works automatically if the first one fails.

The dog advanced inquisitively in the direction of the thing he had seen moving, but nothing moved again until he trod directly upon the toad. With two great hops Mr. Toad endeavored to escape, but the dog—oh, foolish youth—would not have it so. In an instant he had snatched him in his mouth and at that same instant the secondary defence of the toad had come to his rescue. The nauseating contents of the batrachian's glands had been ejected into the mouth of the Airedale. A horrid stinging sensation frightened and terrified him into dropping the creature at once. Froth gathered as though an ounce of fruit-salts had been dumped in the dog's mouth. Stinging and burning he rolled over, coughing, and pawing his cheeks, wild with fright and mortification.

Gradually the thing passed off, leaving no ill effects, but a much wiser dog, and with immense relief the Airedale felt himself quite normal once more.

All this time Roda had remained motionless, squatting upon her haunches and waiting, more with an air of boredom than amusement. All dogs must have their first meeting with a hop-toad, and I have no doubt that Roda was thinking of her own little incident of this kind sometime in the dim past, as she watched her companion learning his lesson.

The dogs now headed for Tokaneeke, trotting side by side. It should be mentioned here, that although this younger dog was a nondescript and sometimes foolish

Airedale, he was, nevertheless, Roda's chosen mate. He was the youthful father of a number of her offspring and the only suitor to whom she had been truly faithful during her later years. She met him regularly every morning when the weather was fair, and together they roamed and hunted the countryside. On certain mornings the dog would be confined to his house when Roda arrived for their daily hike, and upon such occasions the fact would be brought to the attention of his mistress by Roda's imploring whines at the door of the house. Roda knew the tender heart of her friend's mistress and her whines always brought the desired freedom of her consort.

I had difficulty in following the pair now, for the reason that they had cut into the woods, but as there were many open spaces, I could occasionally catch a glimpse of them stalking along, tails down, ears erect, as though their very lives depended upon the work ahead.

Airedales have a tendency to return thus to the semi-wild state and I am certain that Roda could easily keep herself abundantly supplied with food by her own hunting. When she has puppies, she brings them wild food almost daily and often she has returned to me with telltale feathers adhering to her muzzle, or wounds that could only be inflicted by squirrels or rats and other small rodents. Once she brought home a fine raccoon skin that had only recently been removed from the animal by some trapper, and she is one of the few dogs who appear to have no fear of skunks, sometimes returning home redolent and half blinded by this little animal's ammunition. It may be three or four days before she is fit to hunt again after such an adventure, but Roda goes right back for more!

The dogs continued to hunt steadily, stopping occasionally to listen and sniff the air. Presently there was a bark from one of them and in an instant they were off up a wooded hillside in pursuit of a woodchuck. With all his speed and wildness the marmot had no chance whatever, for his short legs could not keep him beyond the reach of the two dogs, who appeared as wild and hungry now as any pair of wolves. The whole thing was over in a minute. No sound of anguish had come from their prey. It was all too quick, too accurately done to allow of an outcry, and the dogs had their meal after the natural manner of their race.

This episode ended the hunting for the day. Both dogs appeared entirely satisfied with their early results, and I imagine that the daily schedule calls first for a successful hunt, whether it require an hour, as on this lucky day, or the entire twelve hours of daylight. At any rate there was no question in the dogs' minds, and they soon returned to the road, much to my satisfaction.

From now on the two became typical bums of the highway and I was able to follow them successfully for hours. They never once turned to the woods or fields again as long as I watched them, but nothing escaped their attention within the narrow avenue of their hike. They visited front yards and backyards, stables and outhouses, chicken coops and other dog houses. At many places they appeared to be well known characters, even going on people's porches, and on one occasion being petted and fed by an unobservant but amiable old lady who called Roda Charlie!

At other establishments they were thrown out unceremoniously, stoned, and pelted with sticks and doused with water. I could not help laughing heartily at seeing them come flying out of some irate person's yard, their tails down and their expressions those of utter dejection. They would run down the road a bit, and then like two school boys in similar circumstances, would stop and look insolently back from a perfectly safe distance.

They had met many dogs on their journey and most of these appeared to be old friends. At the sight of one, they would stop automatically for a minute, and then walk gingerly towards it, moving slower and slower as they approached. At the actual meeting there would be a more or less stiff and formal how-do-you-do in dog fashion, the males would kick up a bit of dirt and the incident would be over. All went well with the other dogs of the country for a time, but late in the afternoon, when both the airedales were fagged and dirty, they ran square into a most disagreeable personage in the form of an English bulldog.

He loomed in the road ahead like some horrid demon, his great square head and ugly bow legs striking terror to Roda's heart. Just what emotions were being recorded within the other Airedale would be hard to imagine, for here was the worst of dog adversaries and a total stranger, and his shuddering mate might be the forfeit should the wrong move be made. The bull took the initiative, after the manner of his kind, and made one

SWIMMING HOME ACROSS THE INLET

headlong rush at the male Airedale. Then followed a battle into the detail of which I will not go. Suffice it to say that I stayed in my car only because I was loath to sacrifice my spying upon a day in dogdom and because things never got to the danger point. It was a display of courage and physical power, replete with doggy oaths that seemed to instill more fear into Roda's quavering body.

All through the fight she paced up and down as one not knowing how to act or what to do, not daring to interfere in the combat, not wanting to keep entirely out of it. All this time the two opponents were growing weaker but the Airedale, being younger and a brave animal, had the better of the match. I was about to step in and stop the inevitable ending, when the bull tore loose and ran down the road, crying in defeat. The Airedale was content not to follow up his splendid victory.

Roda came at once to him as he sank down to rest at the roadside, and like the female throughout the animal world where there is intelligence, ministered to the wounds of her hero. She bathed him from head to foot, tended every wound and scratch with her long red tongue, soothed him and licked his dear face tenderly, until his strength began to return.

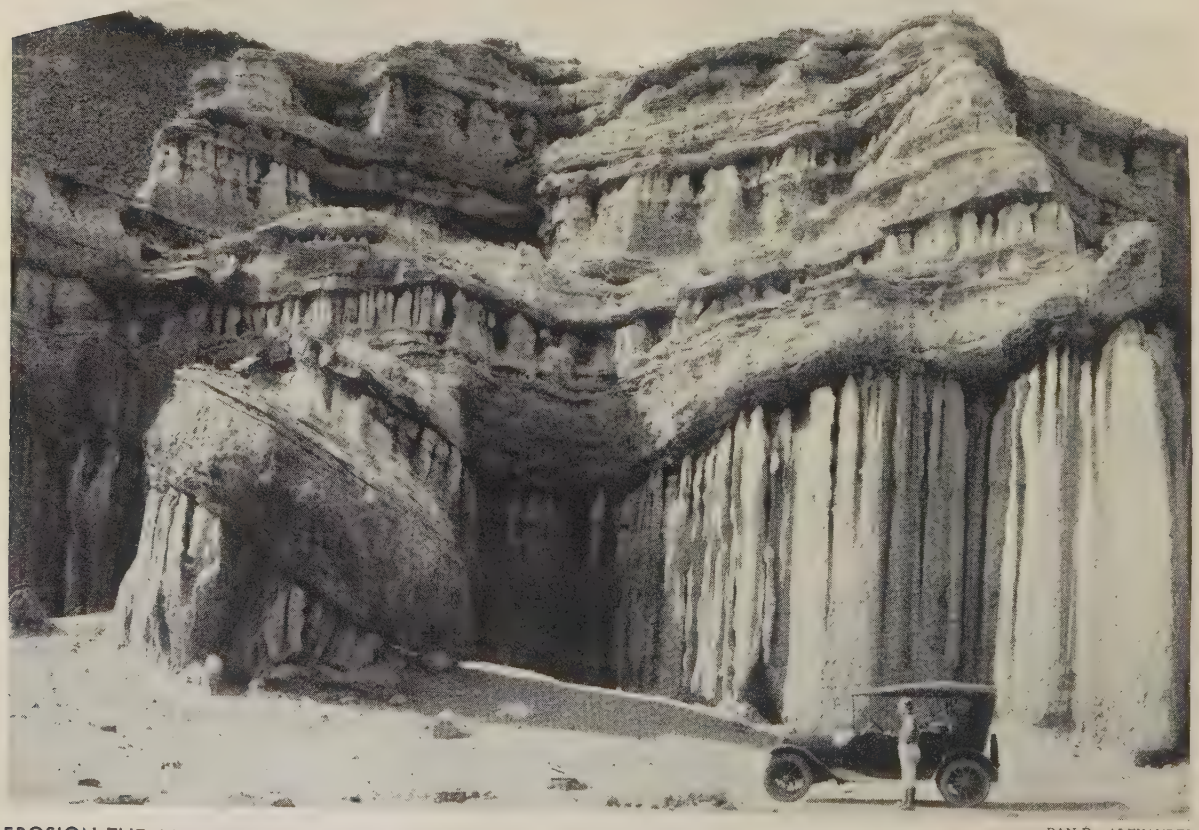
It is wonderful to watch a dog come-back, for it is so rapid compared to our own standards. In a very short time after the fray, the mates had taken to the road again, one limping, both happy, but this time their tired heads were turned towards home, for the day was waning.

I turned homeward also, and before I reached my door twelve miles had been recorded by the meter. At four in the afternoon I was sitting comfortably upon the porch, but it was not until well after six that I saw Roda and her mate again, and this time came the greatest surprise of the day.

My house is on the edge of an inlet from Long Island Sound, and the water forms a sheet perhaps an eighth of a mile wide between my land and the other shore. Presently I heard the barking of a little black and white dog that lives across the inlet and upon looking up to see what the commotion was about, I spied Roda and her companion swimming across the water toward home!

They swam steadily and as straight as an arrow to the salt meadow below the house, and here, covered with mud and wounds, but no doubt refreshed after their long day, they shook off the water and without another minute's delay or another look at each other parted, and trotted to their respective homes.

When Roda mounted the porch steps, she was filthy beyond description and coated with burs. At the sight of me she burst into her broadest smile as I scolded her amiably, as I always do when she returns to the fold. Soon she settled down comfortably upon the door mat. All was still for a moment, then another deep sigh of contentment, and sleep had come to rest her tired body.



DAN P. ALEXANDER

EROSION THE ARCHITECT OF RED ROCK CANYON

Vivid reds, yellows and greens color the walls that rise abruptly several hundred feet in this canyon in the Mojave Desert about 125 miles from Los Angeles. The vertical columns are of the light shades and the horizontal in the most beautiful shades of red

U. S. DEPARTMENT OF AGRICULTURE

HARVESTING SUNSHINE IN THE OLD WAY

Raising agricultural crops is a crude and inefficient method of capturing solar energy, unworthy of a scientific age

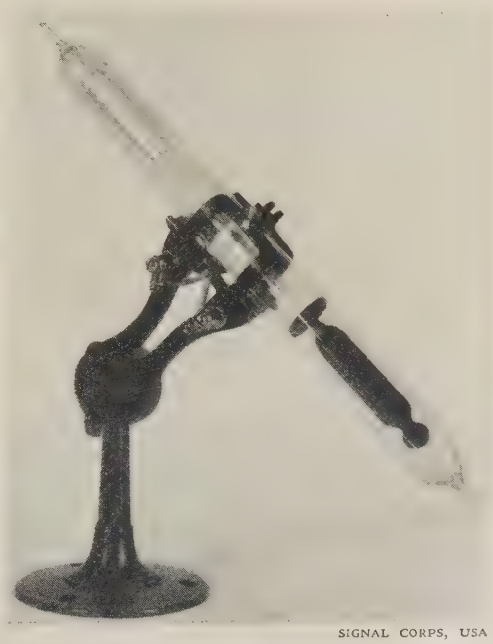
NEW IDEAS ABOUT SUNSHINE

HOW SOLAR RAYS OF MANY KINDS AFFECT MANKIND

BY CHARLES FITZHUGH TALMAN

I DO NOT know what Wordsworth meant when he said, "The sunshine is a glorious birth." Perhaps he didn't either, or perhaps he wrote "sunrise" and the printer was careless. But I know that he was enraptured with the dazzling beauty of the solar beams and his emotion sought outlet in song. In all ages poets have paid homage to the beauty, the power and the beneficence of the star that rules man's little corner of the universe.

Sun worship is the most spontaneous and most widely diffused form of religion. It would be easy to fill several of these spacious pages with the names and attributes of the sun gods of all nations, to enlarge upon solar rites and ceremonies, and to adorn our text with pictures of well-known solar temples and monuments from Baalbek to Stonehenge.



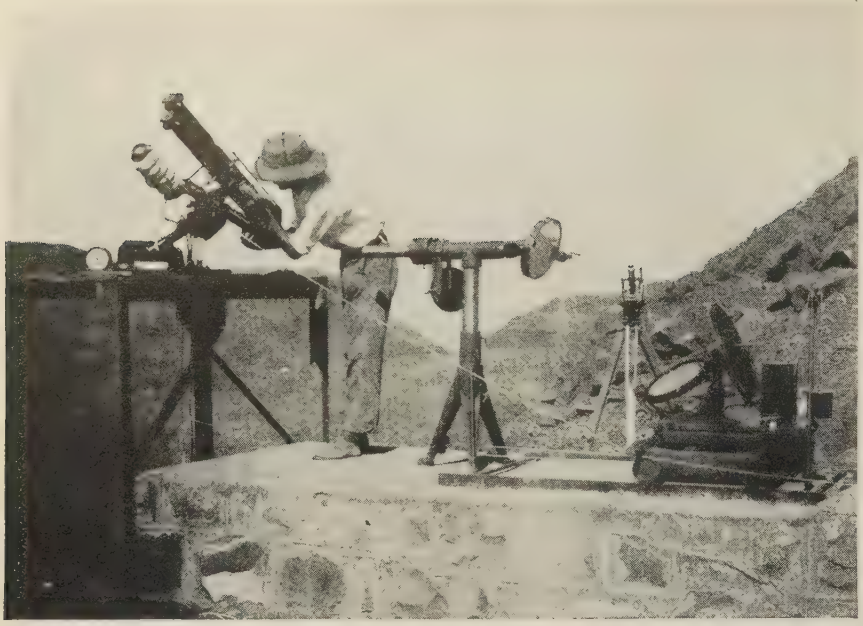
SIGNAL CORPS, USA

ELECTRICAL SUNSHINE RECORDER

Like the sun dial, it "counts only the sunny hours", making a continuous record each day of the duration of sunshine

The enormous importance of the sun in human affairs is an old story. Yet it is a story of which new chapters have lately been written, while others are now in the writing. Moreover, the best of it remains to be told. We are just beginning to get an insight into sunshine. We are beginning to realize how crudely and imperfectly men have hitherto adjusted their lives to its powers for good and ill. The future will correct all this. Man will find his place in the sun.

Let me illustrate how much room for improvement there is in our present methods of dealing with sunshine. The energy that we derive from our food and that keeps our bodily machinery in action is all obtained, directly or indirectly, from plants, which extract it from the solar rays. The energy of the fuels we burn is likewise all obtained through the agency of plants from the same source. Coal and oil contain solar energy that was stored up in the vegetation of bygone ages. Agricultural crops contain a store of energy captured from the sunbeams in the course of a growing season.



MEASURING THE SUNBEAMS ON A MOUNTAINTOP

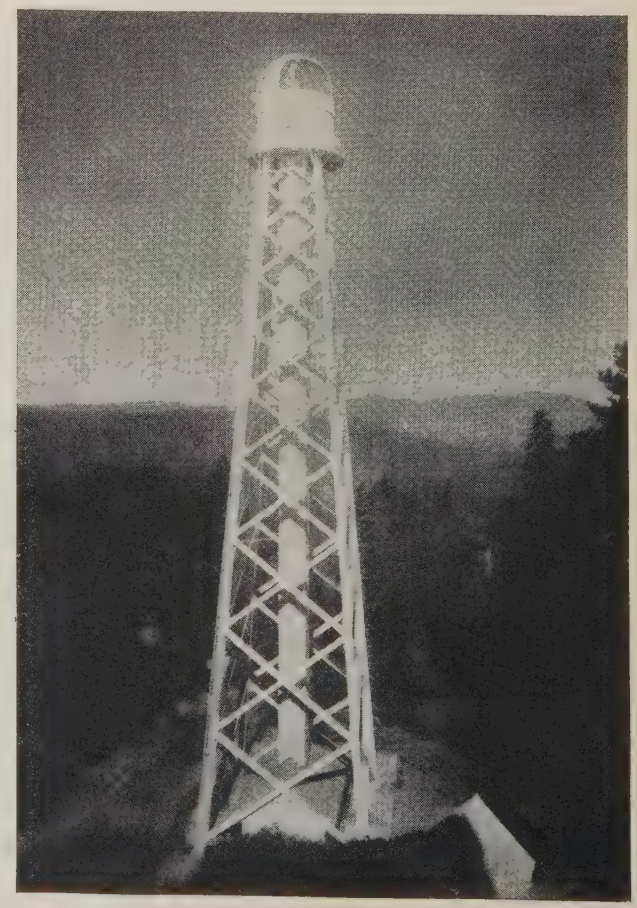
The "solar constant" station of the Smithsonian Institution on Mount Brukkaros in Southwest Africa

A great deal of fervid rhetoric has been devoted to these processes, which are described as "miracles of nature" and so on, but under the cold scrutiny of science they lose much of their glamour. Do you know how much of the solar energy that shines upon a plant is captured and preserved? Between one and two per cent! No wonder the coal beds that took millions of years to make are only sufficient to supply the needs of mankind for a few centuries. No wonder the labor of millions of farmers has often been set at naught by a spell of bad weather, and famine has stalked the earth.

That these woefully inefficient methods of utilizing the energy of sunshine should prevail in our enlightened age is an astonishing paradox. Surely they cannot prevail much longer. I think it is not rash to predict that fifty years hence we shall no longer look to the vegetable kingdom for either food or fuel. Agriculture will be an obsolete industry, and whatever coal and oil remain in the ground will serve only as raw materials for the manufacturing chemist. Energy will be obtained in some more direct and far less wasteful way from the vast largess of radiation that comes to us every day from the sun.

To our ancestors of some generations ago sunshine seemed a simple thing. They thought of it only as heat and light. We now know it is immensely more complex. The first inkling of its complexity was obtained in the middle of the seventeenth century by Sir Isaac Newton, when he passed a sunbeam through a glass prism and thus separated white light into a sequence of colors, ranging from violet at one end to red at the other. Newton discovered a part, but only a part, of what we now call the "solar spectrum." Since his day the world has learned that the same process of refraction or diffraction that separates the colors of visible light also spreads out for our inspection, by certain indirect methods, series of invisible rays beyond the red in one direction and beyond the violet in the other. The first of these series—the "infra-red"—is responsible for most of the heat we receive from the sun. The other series—the "ultra-violet"—is especially active in promoting chemical changes. It is the invisible ultra-violet rays in sunshine that cause sunburn, and they have a number of other effects on living matter that have lately brought them into great prominence.

According to modern conceptions, the different parts of the spectrum correspond to waves of different lengths in the ether, which is supposed to fill all space. Of the visible rays the red are longest and the violet shortest. The infra-red rays are longer than the red, and the ultra-violet shorter than the violet. All travel at the same speed—about 186,000 miles a second. The waves that make up a sunbeam are excessively small. Thus of the shortest waves of violet light it would take more than 64,000 to span one inch.



A MODERN TEMPLE OF THE SUN

The great tower telescope, for solar observation, at Mount Wilson Observatory, California

Sunshine is complex not only on account of the immense number of rays of different wavelength that come to us from the sun, but also on account of many that don't. In the course of its journey from sun to earth, solar radiation undergoes a sifting process. Many rays are sifted out by the atmosphere of the sun and many others by the atmosphere of the earth. The result of all this is seen in the thousands of dark lines and bands that cross the image of the solar spectrum, as produced with a powerful spectroscope. The sifting is due to absorption of radiation by different gases encountered *en route*, and each kind of gas produces lines of definite places in the spectrum. The identity of the substances causing a large proportion of these lines has been definitely established.

YOUNGSTERS GO TO THE SUN AS A HEALER

Invalid children basking in the strong sunshine of the high Alps in a setting of ice and snow

Thus the spectroscope has furnished proof that a majority of the chemical elements known on earth and also a number of known chemical compounds exist in the sun. Lines due to substances in the earth's atmosphere are called "telluric lines." One fact that enables us to distinguish them from lines of solar origin is that they are generally strongest when the sun is low and when its rays must consequently pass through a large extent of atmosphere before reaching the spectroscope. At least four gases of our atmosphere absorb solar radiation and thus produce lines or bands in the spectrum —water vapor, carbon dioxide, oxygen and ozone (a special kind of oxygen).

DESERT SANATORIUM OF SOUTHERN ARIZONA

MEASURING ULTRA-VIOLET SUNSHINE

A unique adjunct of a sun-cure sanatorium in Arizona, equipped with apparatus devised by Dr. Edison Pettit

With its innumerable widely different kinds of radiation and the many vacancies in its sequence of radiations caused by various absorbing substances in the solar and terrestrial atmospheres, sunshine is bewildering in its complexity. It is made still more so by a number of striking variations to which it is subject. There are, first of all, variations in the amount of radiation given off by the sun and there are more complex variations in the amount that reaches the surface of the earth and affects the earth's weather.

Variations in the sun's output of radiation, though they undoubtedly exist, have given rise to much controversy and they are still quite imperfectly understood, owing to the great difficulty of measuring them. The total amount of radiation received from the sun at any place during a given period of time is usually measured by means of instruments called "pyrheliometers," which record the radiation in heat units (calories). The Smithsonian Institution maintains three stations on mountaintops in different parts of the world, where the atmosphere is particularly dry and clear, for the purpose of making daily measurments of solar energy as little affected as possible by atmospheric absorption. There appears to be a slight increase in the amount of radiation from the sun at times when sunspots are numerous, and this happens about every eleven years. There are also small irregular fluctuations of shorter duration.

Then, again, the sifting that the sunbeams undergo, as already described, before reaching the earth's surface varies greatly from place to place and from time to time. Some variations of this sort doubtless occur in the sun's atmosphere, but those that exercise the most conspicuous effects on earth are due to conditions in our own atmosphere. The telluric lines in the solar spectrum show marked variations in strength apart from those due to the varying height of the sun above the horizon. Dust and smoke in the atmosphere obstruct the passage of solar radiation, especially that of short wave-length. Very little ultra-violet sunshine gets through the smoky atmosphere of the average city.

A SOLAR RADIATION STATION OF THE WEATHER BUREAU
Radiation is measured by the two pyrheliometers on the platform. The observer is measuring polarization—which is "another story"

Undoubtedly one of the most gigantic tasks that science has on its hands today is that of taking stock of sunshine. This job has been tackled in a great variety of ways. The intensity of solar radiation as a whole is measured regularly at scores of places in many countries in addition to the mountain stations just mentioned. Hundreds of instruments known as "sunshine-recorders" are in use for keeping records of the duration of bright sunlight day by day. Other instruments record the intensity of daylight in both sunny and cloudy weather. One specialist has spent several years in traveling to various parts of the world for the sole purpose of studying the composition of visible sunlight in different colors. He uses glass filters to isolate the rays of a particular color. One discovery he has made is that tropical sunlight contains proportionately more violet and less red than the sunlight of the temperate zones. Perhaps this difference has something to do with the effects of tropical climate on human health.

The ultra-violet rays of sunshine have been studied with great care in many parts of the world, and some remarkable facts concerning them have been brought to light. It is found, for example, that the intensity of ultra-violet does not vary in the same way as the amount of heat received from the sun. It is much greater in the autumn than in the spring. Another curious fact is that a larger proportion of ultra-violet is contained in the light coming from parts of the sky away from the sun than in direct sunlight. This is the reason why the "sun cure," which depends chiefly upon the health-giving effects of the ultra-violet rays, can be carried out in the shade on sunny days, and, in the pure atmosphere of mountain health resorts, even on cloudy days.

Ultra-violet sunshine (within certain limits of wave-length) is now regarded as a specific cure for rickets, surgical tuberculosis and some other ailments, besides having a generally beneficial effect upon health. Formerly a favorite prescription of the doctors was "plenty of sunshine." Now the tendency is to specify an ultra-violet sunshine and also to prescribe the intensity of radiation and duration of exposure appropriate to each case. There is a sanatorium in Arizona where elaborate apparatus has been installed for making a continuous record of the intensity of ultra-violet every day in order that the patients may get the proper doses of this invisible medicine which, with improved methods, should be free to all mankind.

Since common window glass is almost opaque to ultra-violet rays, it appears that the old-fashioned ideas about the benefits derived from indoor sun-baths, unless taken with open windows, were more or less delusive. Recently several special kinds of glass and glass-like substances that transmit a large proportion of ultra-violet have been introduced as substitutes for ordinary glass in windows, the best material for this purpose being fused quartz.

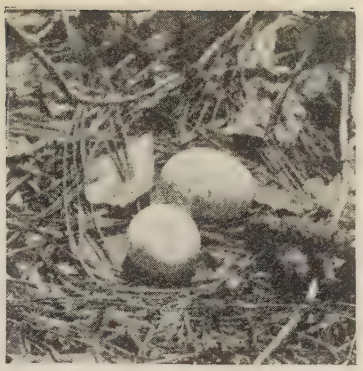
All these substitutes are, however, quite expensive, and their practical value is, at best, limited by the fact that the amount of ultra-violet in the sunshine outdoors is often very small—especially in the polluted air of cities and in winter—and is always variable and uncertain. Eventually, and perhaps in the near future, we shall probably have *artificial* sunshine in our homes and other buildings, rich in ultra-violet rays of suitable wave-lengths for promoting health, and superior to the best outdoor sunshine in at least one respect; viz, the fact that the supply will be under perfect control. Engineers are spending much time on this problem.

On July 6, the first two American Nature Association official parties will leave Chicago. One has on its schedule Glacier National Park, the glorious Inner Passage of British Columbia and Jasper National Park, Canada. The other group is headed toward Yellowstone Park, to see this marvellous sanctuary as few tourists see it. The brief brochure, "On Western Trails", will more fully explain this latest Nature activity of the American Nature Association, and will gladly be sent on request

CHUCK-WILL'S-WIDOW

A STUDY OF A NIGHT-FLYING FAMILY

BY CAPT. CHARLES L. STEEL



LAID ON THE BARE GROUND
The two large white eggs, blotched with gray and lavender, are well cared for

THE Goatsucker family in its entirety has always been the subject of many weird superstitions among those who know its members only superficially. Strange to relate, only evil has been ascribed to these birds, and yet there are no more beneficial birds than these same chuck-will's-widows, whip-poor-wills, night-hawks and their cousins. The extremely large mouths characteristic of the family gave rise in olden days to the legend that they sucked the milk from goats and cattle, hence the name, Goatsuckers, while the weird calls of the whip-poor-will or the chuck-will's-widow coming from the dark woods during the night has caused many strange tales to be told connecting them with supernatural happenings.

In reality all members of this family feed entirely on night-flying insects and are of the greatest benefit to the human race. They have enormous mouths but very tiny beaks and their feet are very small in proportion to the rest of the body. They keep mostly to the woods, where during the day they rest lengthwise along the limbs of trees or on the ground, generally where the shifting play of sunlight and shadow causes their protective coloring to harmonize perfectly with the bark and lichens of the branches or dead leaves and broken twigs on the ground. As soon as dusk approaches, the unsuspected knot on the limb of some tree or the unobtrusive bunch of dead leaves rises on silent wings and goes about the night's business of catching and consuming uncounted thousands of nocturnal insects. Mosquitoes, gnats, moths and beetles form the greater part of their diet. The feeding is done entirely on the wing and so expert are these birds in capturing their prey that night-hawks have been seen to catch the swiftly flying dragon fly.

The chuck-will's-widow is among the largest of our Goatsuckers and is probably the least known. This

THE CHICKS ARE THREE DAYS OLD
They resemble the barnyard variety except for large eyes, larger mouths and flat heads

THEN A WOODLAND TRAGEDY HAPPENED TO THE FAMILY
Only one remained, and his parents transferred him to a new resting place

THE CHUCK-WILL'S-WIDOW ON HER NEST
She would allow a near approach before taking wing, relying upon protective coloration to save her

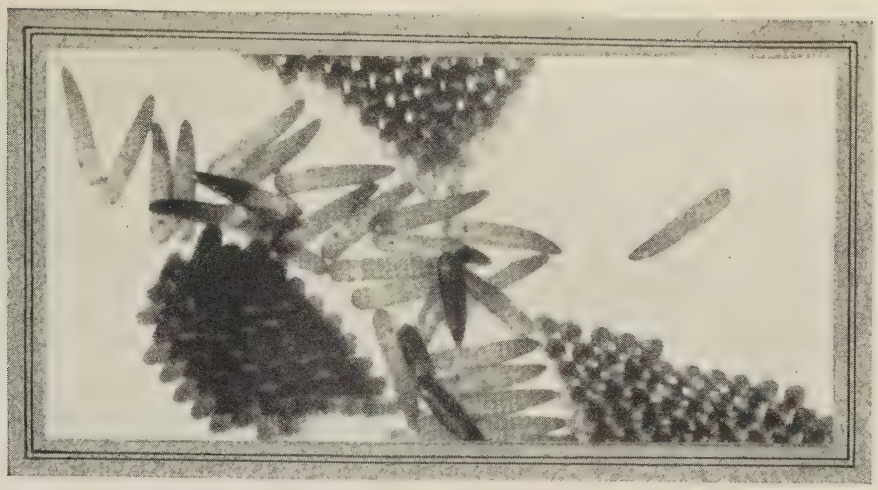
bird ranges throughout the South Atlantic and Gulf States and as far west as Texas. It breeds throughout its range. It is about twelve inches from tip of beak to tip of tail though it appears much larger due to its wing spread of nearly two feet. In color it is mottled with reddish brown, dusky gray, dull black, buff and dingy white. The male has a white tip to the tail feathers which is lacking in the female and a narrow white band just below the throat, which in the female is buff. The note is quite similar to that of the whip-poor-will but has four distinct syllables —"chuck-will's-wid-ow." It is whistled repeatedly during the night but, unlike the cry of the night-hawk, never while in flight.

Late in April or early in May the birds mate and immediately start housekeeping. No nest is made. The two rather large white eggs, blotched with gray and lavender, are laid on the bare ground or dead leaves in the woods. Both birds assist in incubating the eggs and during this period, which lasts from eighteen to twenty-one days, allow an approach to within two to three feet of them before taking wing. They rightly rely upon their perfect camouflage to escape detection. Once disturbed, however, they exhibit much concern. They remain in the immediate vicinity and flutter on the ground with half opened wings and wide open mouth, presenting quite a terrifying spectacle. When the young hatch they are covered with soft, fawn-colored down and are quite helpless. They grow rapidly, however, and by the time they are a week old are able to hop about. The parents resent intrusion now more than ever and will fly at the invader with wide open mouth, emitting a slight hissing sound and presenting every appearance of being most dangerous customers. If continually disturbed the old birds will move the youngsters to a new location, sometimes as much as sixty feet from the old home site, carrying them in their mouths as a cat does her kittens. At the age of two weeks the young birds begin to fly a little and by three weeks fly perfectly.

I discovered the nest of a pair of chuck-will's-widows on the Fort Benning Reservation, Georgia, and was fortunate enough to be able to observe the family over a period of six weeks. The nest was found on May 12 and contained two eggs. The old bird was very loath to leave and permitted seven persons to approach within four feet before taking wing. Even then she remained close by and used all her wiles to divert attention from the nest to herself, fluttering on the ground with half-opened wings and wide-opened mouth. When the invaders left the vicinity she returned at once to the eggs and permitted her picture to be taken at six feet and then at two and one half feet with portrait attachment.

On May 31 the eggs hatched and two tiny balls of buff colored down took their place. They resembled newly hatched chicks but their large eyes, larger mouths and flat heads denoted their family. Pictures were taken on June 3 when they were three days old. The next visit, paid on June 10, disclosed a tragedy. The old home site was empty and when the new home was discovered some sixty feet away, only one youngster was found. The fate of the other is a mystery. The survivor was able to hop about and was beginning to grow heavy pin feathers on the wings. By June 17 both previous locations were vacant and only after a protracted search was the family again found. The old bird flew up from the ground and alighted along the limb of a tree nearby while the youngster flopped along about fifty feet before coming to the ground again. Upon being approached the little fellow at first put up quite a game fight, opening his mouth and spreading his wings just like the old folks. He also gave little calls which seemed to drive the parent birds to desperation, for both whirled in from the ground where they had been keeping close watch on the proceedings and circled around within a foot or two, keeping up a continual hissing. The youngster finally quieted down and nestled very contentedly in the palm of my hand and as he ceased calling the old birds likewise grew silent, one dropping on the ground fifteen or twenty feet away and the other coming to rest lengthwise on a pine bough just overhead.

At the age of seventeen days the young bird was well feathered and capable of flying at least twenty yards. The family left their nesting site shortly after this, but curiously, as the woods were vacated by the visitors for the last time, one of the birds violated a long-standing family tradition and in the bright sun of a June midday was heard calling—"Chuck-will's-wid-ow, chuck-will's-wid-ow."



EGGS FLOATING ON STILL WATER SURFACES

Like little capsules, they ride on the surface in rafts and usually hatch within a day

WATCH CULEX AS HE GROWS

HOW TO STUDY THE PEST AT FIRST HAND

BY C. F. GREEVES-CARPENTER

PHOTOGRAPHS BY CORNELIA CLARKE

NO GREATER enemies of man exist than certain varieties of mosquito, as those who have read the history of the Panama Canal and the Spanish-American War well know. Vigorous campaigns have rendered him less destructive, and ways of preventing his increase have been developed which practically assure health to any community. The common mosquito, *Culex pipiens,* is a gnat with bad habits, more irritating than death-bringing, however. With all his faults, he is an interesting creature from the egg to the imago stage, and to breed him will insure many hours of profitable study for the Nature class as well as the individual adult student of entomology.

HERE IS A LITTLE LARVA

Note the hairs which draw the food, and the forked posterior

A somewhat peculiar method, however, must be followed in case of our friend with the aggravating buzz. He breeds in the water, and the breeding cages hitherto used must be replaced with a tank of water, the more stagnant, the better. Then comes the hunt for the eggs, and nearly any pond where the currents are slight will serve. Collect some of the scum that forms on the surface —it is practically certain of containing eggs—and place it in the tank. Then watch for the results.

Soon will appear the larvae from the one-layer rafts in which the female has laid her eggs. These larvae have long, slender, wriggling bodies with a forked posterior extremity. The head is fitted with a pair of sculls, or automatic feeders, which in reality are tufts of fine hair, and which, when set in motion, create currents of water to draw toward the larvae the microscopic animals of which their food consists. They breathe through one of the prongs of the forked end of the posterior part of their abdomen, so that they have to go through the curious performance of standing on their heads in the water, and projecting the forked end above the surface to perform this necessary function. A few drops of water, placed on a microscope slide, will show to you the amusing antics.

THE PUPAL STAGE IS AN UGLY ONE

The mosquito here really looks the villain part he plays in world affairs

If this breathing apparatus comes into contact with anything of a dangerous nature the larvae immediately dive, and repeat the performance at a distance from the first spot. Thus fatal consequences develop following the placing of kerosene on the surface, as the insects are unable to penetrate the oily liquid and consequently drown through inability to breathe.

THE PERFECT ADULT OF THE MOSQUITO

Practically all legs. The eyes cover nearly the entire head

The period occupied by the larval stage, during which the insects moult four times, varies in length, but usually about a month passes before they become the active pupae, and each day's happenings must be crowded in the note book. In this state they require no food, having no digestive organs, but demand plenty of air. The pupal state gives place, in about four days, to the emergence of the imago or perfect insect. The gnat now has two long and narrow wings, and three pairs of long, slender legs. These and the entire body are covered with scales. The antennae or feelers of the males are bushy in appearance, while those of the females are somewhat thinner. Their eyes, which cover practically the whole of the head, appear in certain lights to be of a green color, but in others, red. That part of the gnat's body which is responsible for the opprobrium with which the insect is regarded is a proboscis, cylindrical in form, and terminating in a small knob. It is with the trunk that the gnat punctures the skin of its human victim, and injects a liquid irritant. The trunk is extremely fine, and Réaumur said of it: "The point of the finest needle compared to the sting of the gnat, is the same as the point of a sword compared to that of the needle." The female gnats require blood to be able to ripen their eggs, but the males content themselves with plant juices.

A WELL-GROWN MALE

Here are shown the bushy feelers, which in the female are simple

Since it is common knowledge that mosquitoes are disease carriers it will be seen that it is decidedly dangerous to leave our adults, so carefully grown, to run free. About a day before the imagos are due to appear, a top should be placed on the tank. After all the necessary observations are made, it will be easy to raise the cover, gently insert the nozzle of some standard fly sprayer and kill off the army, before it gets abroad. Specimens can be preserved for study under a microscope.

Once our study is completed, we can see how really dangerous the mosquito is, and how necessary it is for all cesspools, cisterns, wells, rainwater tubs and such, to be covered with fine wire mesh, and wet ditches by the side of the house or garden to be flooded with a little kerosene. Similarly, puddles in yards and other places should be dried up, or kerosene poured on the surface. Prevention is better than cure, and mosquitoes are no playmates for civilization, as we have discovered. During the past thirty years, great progress has been made in mosquito control, and parts of the tropics have been made safe for human occupancy. The airplane has been brought into play to distribute arsenical dust over large areas. Wholesale draining and oiling have helped. Man is learning how to conquer an insect that demanded in the tropics an annual toll of lives, and elsewhere ceaseless attention. But, though Culex is an enemy, he presents interesting study.

There has been an appreciative and popular reaction to the policy of special geographic numbers of Nature Magazine twice during the year. There have been numerous inquiries as to what section will be covered in the next special issue. We are glad to announce that the issue of next December will be a Texas number and a distinguished group of contributors is already at work on the articles

BLACKBURNIAN WARBLER—*Dendroica blackburniae*

BLACKBURNIAN WARBLER

These brilliant orange and black songsters, quick moving and restless, are truly wood-warblers and live in the topmost branches of our tallest conifers. Perhaps this fact may account, in part, for their seeming scarcity as it is difficult to take a census of tiny birds at so great a height. One of their habits is to catch insects on the wing. Their nests, placed saddle-wise on the topmost horizontal limbs, are large and compact, made of a densely woven mat of down with a lining of inner bark fibers and horsehair; the outside covered with rootlets and twigs. The four eggs have speckles of reddish-brown over bluish-white, and are laid late in May or early in June. These warblers breed from Manitoba and Cape Breton Islands to the northern tier of states east of the great plains, and in the Alleghanies from Pennsylvania to Georgia. They make their winter home in Central America southward to Colombia, Venezuela and Peru. Their migration route is divided; some go by way of Mexico and others through the Bahamas.

REDSTART

Among the most attractive and colorful of our warblers are the redstarts which dart about through the branches of our deciduous trees gathering insects on the wing, scooping them from a leaf or stopping momentarily on the tree trunk to take in a caterpillar. Constantly on the move with their tails fan-fashion and their wings spread to show the brilliant orange, black and white markings, they seem indeed bits of flashing flame. The more quietly colored females choose crotches eight to ten feet above ground for nesting sites, and build their nests of leaf stalks, plant fibers, shredded inner bark, lined with fine rootlets and grasses. The three to five finely spotted eggs are grayish white with variously distributed marking of reddish brown. They breed from central Canada in the north, south to middle United States and have been found in migration in Oregon, California, Lower California and Arizona. They winter in the West Indies and from Central Mexico to Ecuador and Guiana on the South American Continent.

REDSTART—*Setophaga ruticilla*

YELLOW WARBLER—*Dendroica aestiva*

YELLOW WARBLER

These are summer warblers often called wild canaries by those who do not notice the slender bill and the red brown markings on the underparts. They are among the best known of their kind, possibly because they inhabit a wider area. They breed nearly throughout wooded North America, and winter from southern Mexico to Peru and Brazil. They nest in willow clumps near water ways, in orchards, in garden shrubbery, or in open growths almost anywhere. They build a well woven, symmetrical basket of plant fibers and grasses lined with down and sometimes horsehair and feathers. They are often chosen as victims by the cowbird, but these warblers may foil her purpose by weaving a false bottom over the undesired egg, and have been known to repeat this until they had a three storied structure. Their own eggs number four or five and vary from greenish white to a rich light green over which the heavy markings of dark brown and purple-gray are evenly scattered, or collected as a wreath about the larger end.

GOLDEN-WINGED WARBLER—*Vermivora chrysoptera*

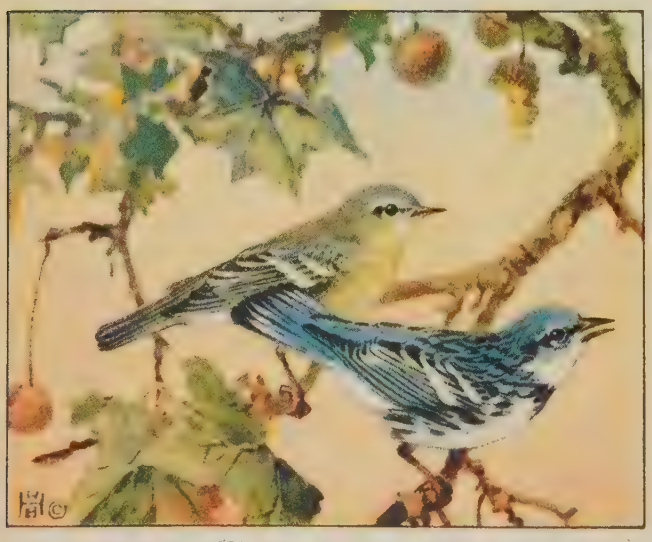
GOLDEN-WINGED WARBLER

These beautiful warblers breed from southern Ontario, northern Wisconsin and Southern Michigan, south to northern Illinois, Indiana and Ohio; and in the mountains from New York to northern Georgia at an elevation of two to four thousand feet, but are rather rare in the northeast. They are similar to the Blue-winged warbler in habits of searching for aphids and small green caterpillars among the branch tips of deciduous trees in old pastures or in shady thickets beside bottom-land creeks. While hunting, the males utter the characteristic, lazy song by the hour. Their bulky nests are placed on or near the ground. Dry glossy leaves, stems upward, are used as a foundation for grapevine and inner tree bark, above which there is sometimes a lining of fine grasses and long horsehair. The structure is built at a slight angle, thus giving a half-roof over the four to six creamy eggs which are strongly blotched with tones of chestnut brown. These are cared for entirely by the female. They winter from Guatemala to Colombia.

BREWSTER'S WARBLER

These warblers have a much wider distribution than Lawrence's and their breeding range also coincides with that of the breeding ground of the Blue-winged and Golden-winged in northern New Jersey, New York and Connecticut. There are also records of Brewster's warbler occurring in Ohio and Michigan. Their nest building and habitat are, of course, covered in the descriptions of Blue-winged and Golden-winged, the parent stocks from which these hybrids spring. In general their song may be that of the Golden-winged, with slight variations, or like the Blue-winged, also with variations. In one case a typical Brewster's warbler had only one style, exactly like that of the Blue-winged, insistently repeated with no variation; therefore, the song gives us no certain key to identification. However, we know that this distinct form exists in sufficient numbers to warrant a place as a species. Observation in their winter home is still desirable; however, they doubtless migrate with other warblers.

BREWSTER'S WARBLER—*Vermivora leucobronchialis*



CERULEAN WARBLER—*Dendroica cerulea*

CERULEAN WARBLER

These are truly woods warblers that choose open groves of mixed deciduous trees, where they seldom hunt nearer the ground than twenty feet, and more commonly from that height to the tops of the tallest trees where they may be mistaken for small flycatchers, titmice, or creepers. They usually hunt in companies and are locally abundant throughout their range west of the Alleghanies to Nebraska and Minnesota. Their rather shallow nests are saddled well out on limbs twenty to seventy feet up in trees and are built of very fine grasses bound together with spider webs and ornamented with pale lichens, lined with brownish grasses. The eggs number three or four and are greenish or bluish white, speckled over the entire surface with red-brown and lavender. The female sits closely and cares for the family unaided by the male. In common with all warblers, they are beneficial insectivorous birds. They spend the winter in South America from Panama to Peru, leaving their northern homes in late August.

BLUE-WINGED WARBLER

These dainty warblers at times move about with vireo-like deliberation and again will investigate an interesting cocoon, back down, in approved chickadee fashion. They come farther north than the usual range of southern warblers, breed in Connecticut where they are common during the nesting season, west through Iowa almost to the plains; rarely farther north. They are birds of woodland edges, swampy second growth and weedy tangles along roadsides. They place their nests on the ground in dense tufts of weeds and bracken; deep cup-like depressions above which the stem ends of the outside leafy layer extend in a protecting arch over the three to five pinkish white eggs which are faintly marked about the large end with tones of brown. The female sits closely and is not easily frightened away during the ten days of incubation. The male appears when it is time to gather food for the babies. These warblers spend the winter from northern Mexico to Colombia, leisurely passing southward in small flocks.

BLUE-WINGED WARBLER—*Vermivora pinus*

LAWRENCE'S WARBLER—*Vermivora lawrencei*

LAWRENCE'S WARBLER

The limited distribution of these warblers coincides with a portion of that of both the Golden-winged and Blue-winged warblers. They are known to breed in northern New Jersey, southern Hudson river valley and east to the valley of the Connecticut river. Their winter home has not been determined. They inhabit open woodlands along shaded thicket-bordered streams. It is supposed that they result from the interbreeding of the Blue-winged and Golden-winged warblers as both typical Blue-winged and Lawrence's have been found in the same nest. Lawrence's warbler has the wing and body coloration of the Blue-winged with the throat and earmarks of the Golden-winged. Even their songs intermingle, one individual using, principally, the notes of the Blue-winged, another those of the Golden-winged with gradations and original combinations tending rather toward the Blue-winged slow two-note style. The discovery of this rare feathered beauty marks a red-letter day for any observer. The records are few.

PARULA WARBLER

These warblers have the habit of feeding chickadee fashion; this together with their small size, blue color and conspicuous wing bars aid in their identification. Since they are birds of specialized habitat they must usually be sought in the humid, swampy areas where the lichen *Usnea* abounds, for this they choose to nest in, and of it they construct their cradles. These are made by weaving together the bottom of a pendant clump of lichen, putting in a scanty lining, or none, and making a side doorway, thus they have a roofed, swinging, elevated basket in which to lay the three to five glossy white, chestnut-marked eggs. These warblers are among the tamest and least nervous of their kind. They are birds of the United States east of the plains, and breed north into central Ontario. As *Usnea* grows principally on deciduous trees these warblers rarely visit coniferous groves except during migration. They spend the winters in Mexico and Central America. In habits and song they resemble the Southern Parula.

PARULA WARBLER—*Compsothlypis americana pusilla*

PINE WARBLER

These comparatively large, slow warblers live in pine country from the barrens of Florida, where they sing the first of February, through the Gulf States to northeastern United States and southern Canada. Throughout their extensive breeding grounds they use pine trees, and, only during migration do they sometimes feed in scrubby growths or orchards. Their neatly built nests, usually placed at a considerable elevation near the end of branches among small twigs, consist of thin grapevine bark, weeds and leaves, warmly lined with feathers. It has been known to take fourteen days to build a nest and lay the four eggs, which are beautifully marked with bold blotches of lilac-brown and umber often concentrated in a wreath around the larger end. These birds have been called pine-creeping warblers due to their habit of gleaning from the trunks and limbs of conifers. They spend the winter in the southern part of their range and here they sometimes consort with myrtle and palm warblers and live nearer the ground.

PINE WARBLER—*Dendroica vigorsi*

CANADIAN WARBLER—*Wilsonia canadensis*

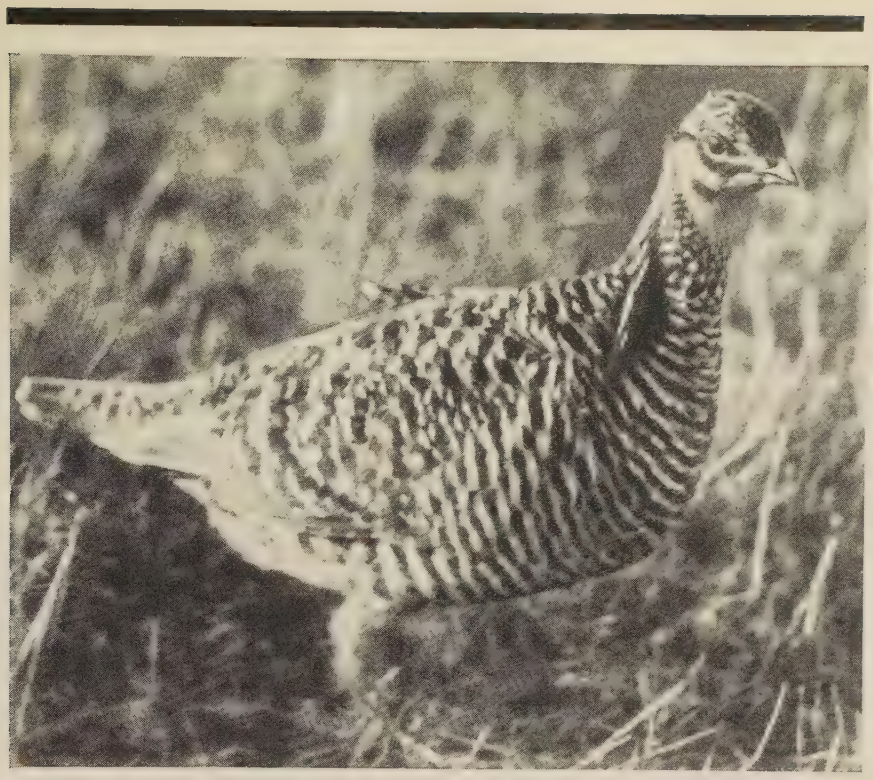
CANADIAN WARBLER

These birds breed in eastern North America, both in Canada and in the Appalachians, usually above 2000 feet, south to North Carolina. They are among the rare warblers seen during migration. The gray back and black necklace are good field marks. They are partial to thick undergrowth in deep, damp forests where they hunt from the ground through bush tops to lower tree branches. They have flycatcher habits and dart after flying insects which they catch with a click of the bill; and constantly glide nervously about, clearing leaves and twigs of insect inhabitants. Their song is forceful and suggestive of a bit of goldfinch music. They place their nests upon moss covered ground in the shelter of logs or under rootlets in a bank. These are usually bulky affairs made of strips of bark and dead leaves with a lining of finer grass and rootlets. The three to five creamy white eggs, evenly marked with red-brown and lavender, are laid late in May or early in June. They winter in Ecuador, Peru, or, sometimes, in Guatemala.

HOODED WARBLER

These beautiful birds flit about from bush to bush in shaded undergrowth of damp woods. The male perches high above as he sings his variable though sweet and attractive song. In the northern part of the breeding range they use laurel or brier tangles: in the southern part, cane-brakes are chosen for nesting sites. The nest materials also vary with the location. In the north are used soft inner bark and leaf skeletons with lining of fine grasses; in the south, cane leaves lined with weeds, rootlets or fibers of old tillandsia. The nest placed on the ground is well woven and compact. The four eggs have a ground color of creamy white with end wreath and general spotting of shades of brown and lavender. Hooded warblers are birds of eastern United States from the Connecticut valley and central New York west through southern Iowa nearly to the plains, and south, except Texas and Florida. They spend the winter from southern Mexico to Panama and, in the spring, they fly directly across the Gulf of Mexico to the southern states.

HOODED WARBLER—*Wilsonia citrina*



THE SOLE REMNANT OF A DYING RACE

Though Massachusetts has contributed many thousands to save the heath hen, this bird alone carries the heritage of his kind

THE LAST HEATH HEN

THE DEATH KNELL OF A SPECIES IS SOUNDED

THE last of his race! Solitary, conspicuous, with never a sound, he feeds quietly on the farm of James Green near Tisbury, Martha's Vineyard Island, while bird lovers come from far and near to study him and to pay him homage before death blots out his species.

To the traditional "booming" ground, where, in former years, flocks of his kind gathered to carry on in the early morning and late twilight hours that curious courtship performance, he came once more this spring, perhaps for the last time. But the warming days meant nothing to him. Not once did he inflate his curious orange sacs. Not once did he boom majestically, as males have been wont to do to attract a mate. He knew. There was no female to admire him; no male to challenge him to such exertion. So he contented himself with quiet feeding, now crouching invisible against the ground as a hawk's shadow floated by, now erecting his head carefully to scrutinize the surroundings—a pathetic figure.

Once so plentiful in the East that servants in their contracts with their masters stipulated that its flesh should not be served more than twice a week, the heath hen has gradually dwindled. Legislation in the past was inadequate and irregular. Though as early as 1839 Lewis rated it as a rare species, it was continually shot down and destroyed. Completely exterminated on Long Island and in New Jersey, where it had formerly been abundant, it made a last stand on Martha's Vineyard Island. The State of Massachusetts, through its Division of Fish and Game, generously aided in the fight to save the species, and up to 1925 had expended more than $56,000 on this work. But a series of disastrous springs, fires and epidemics cut down the brood, and by 1927, only three birds were left. The last two annual heath hen censuses, taken by Dr. A. O. Gross of Bowdoin College, have revealed but one lone individual.

This single bird has been accorded all the honor and attention due a sole representative of a dying race. For more than a month this spring extensive observations and photographic records were taken, so at least in books the species will be preserved. It may seem ironic to some that so much fuss is made over him now when a little less neglect in years gone by might have kept his kind alive. And still more ironic is the fact that he has been allowed to live out his natural existence amid the scrub oaks and fields instead of being killed. This privilege of life and liberty has too (Continued on page 65)

Left to right; a gold wasp, a mason wasp and gold wasp larva. The golden trouble hunter is a parasite of the mason

FATEFUL FORTUNES OF THE MASON WASPS

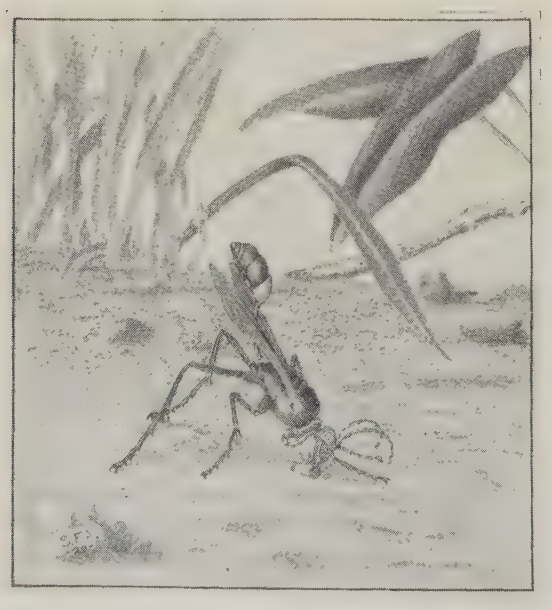
FRIENDS AND FOES MAKE LIFE COMPLICATED

BY S. F. AARON

ILLUSTRATED BY THE AUTHOR

THE student naturalist must relish the demand made upon him for painstaking research and out of his insistent love of discovery he readily appreciates and learns to anticipate not alone those fewer influences that combine in "the gladness of nature"; but principally those tragedies that crowd the annals of the Old Mother whom we have too long been taught to regard as the expression of bountiful gentleness and peaceful care.

Parasitism, in its varied forms, exhibits the common bloodthirst by which a vast majority of creatures thrive.



GATHERING MUD FOR THE NEST

Brown mason wasp at work. The particles are carried in the jaws

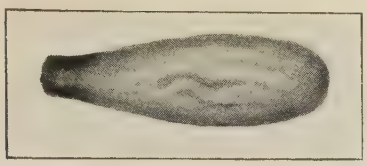
A persistent examination of the remarkably complicated life histories of the mason wasps, or mud daubers, and the means adopted by their numerous enemies, unfolds an intriguing series of events in the perpetuation of species.

Heretofore it seems to have been conceded that the sting-protected Hymenoptera could have no serious enemies. It is well known that the exclusively parasitic groups circumvent each other. That the wasps and bees experience the misfortune of thefts and usurpations has been merely hinted at, however, and, with the exception of the honey bee, very little detailed knowledge has been presented.

The life histories of the mason wasps, when unhindered, have been set forth by entomologists of both continents. Fabre's famous observations are most thorough in describing the habits of the Old World forms, while the Peckhams in Wisconsin, treating our own two species, have far exceeded the French sage with regard to scientific precision and thoroughness.

The blue mason wasp, *Pelopaeus coeruleus* (after Pelops, a savage criminal of mythology) and the longer-waisted, brown, yellow-marked species, *Sceliphron cementarius* (the generic name means a leg of wisdom and refers to the creature's skill, though it really works with its jaws), differ so little in their habits as to make the biography of one precisely fit the other. The blue form seems to be most common in certain locations in the West; the brown wasp is often observed in the eastern sections.

An examination of several mud nests at any time of year and a little close observation of the wasps at work during the summer months will permit anyone to trace the life histories of these builders. After the females have



INTACT COCOON
It is semi-transparent golden yellow

COCOON IN HALF
Showing the full-grown larva in place

AND LATER ON
The pupa before it is ready to cut its way out

mated and have selected a situation for the nests suitably protected from rains, as on the under sides of roofs of accessible buildings, beneath wide rock crevices, or in the mouths of caverns and the insides of hollow trees, active work commences immediately. Damp earth is gathered and within a few hours the first cell is constructed. The outer layer is generally not more than a sixteenth of an inch thick and laid on in rib-like form, often being left to retain that appearance, or to be further plastered with irregular bits of mud.

Spider hunting follows. There is generally a plentiful supply of possible victims near at hand and these may be of all kinds of the busy little eight-legged, many-eyed web makers and others of their class. Probably the orb weavers, crab spiders and jumping spiders are preferred because most easily captured.

The tremendous energy, swiftness and fearlessness of these workers in clay, and the weapons with which they are endowed, make them well-nigh invincible when hunting for their prey. As the Peckhams express it: "Her powerful sting fits her to cope with anything she may meet, but as the size of the cell must be considered and the victim must be carried home on the wing she is on the lookout for something not too large. Here, then, she ceases to be an automaton and to some extent makes use of her wits." Thus the mud cells she builds may receive two or three larger spiders crammed in with force, or over two score smaller specimens packed to the very brim before the entrance is sealed. Something over a dozen is about the average number, each spider being the size of or a little smaller than the thorax of the wasp.

The single egg, each clay cell being the chamber of but one offspring, is deposited within this storehouse of plenty and the entrance is closed. The development of the offspring through its three subsequent stages takes place quite beyond the ken or the further care of the mother who is solicitous only in the preparation for these events.

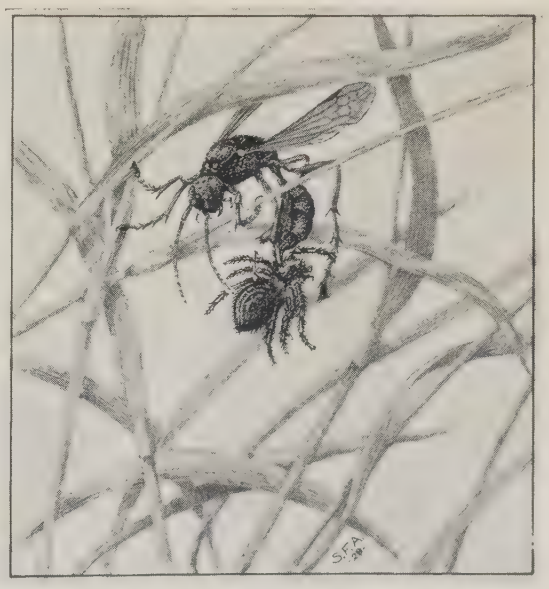
It cannot be fairly determined how many mud nests and cells one wasp will build, but from the appearance of the nests—for there is often an individual difference—and the location, the number may exceed a dozen. There are from two to three broods from late spring to early fall.

A nest selected at random, one of many sealed up and to all appearances normal, will be found to contain when broken open some cells filled with small spiders most of which are dead, others twitching when touched, the latter the result of a not too fatal sting. When dumped out of the cells these living victims often assume attitudes of apparent protest, most natural because of the manner of their taking off. It is really a pathetic sight, but, to be sure, these creatures inflict the same kind of slow poison upon helpless victims.

Any number of cells thus examined—provided they have not been interfered with by enemies of the wasps—tell much the same story. The only differences depend upon the individual dispositions of the workers and huntresses, some being careless or prudent, indifferent or persevering, calm or nervous, lazy or industrious. For the most part the observer may give them the closest scrutiny without their showing anything but fear, even pulling down the nests before their very eyes without the little builders resenting it. But in two instances I have had the brown species fly close to my face as though to give me a stab with her poison, forcing retreat.

Now and then a cell will be found full of spiders all dead and drying up, but intact with no egg present. The entrance is sealed. It is a sheer case of forgetfulness and I have found several cells with the egg in place and unsealed. Perhaps something had happened to the little workers to prevent the completion of their tasks.

The varying dispositions of mason wasps is proved also by their manner of butchery. As the Peckhams have shown, with abundant further evidence, there is no reason for admitting the correctness of Fabre's theory that the sting is given merely to paralyze the victims in order to keep them fresh and softly edible for the larvae. A large majority of the spiders caught are killed at once; all of them will be found dead in some freshly-stored



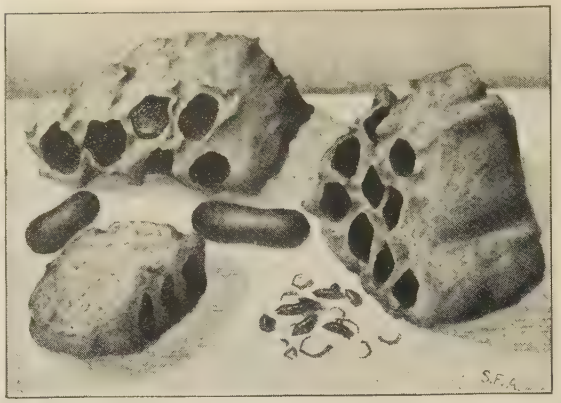
BLUE MASON WASP HUNTING
Stinging a captured spider to kill it or to render it helpless

cells, half or more in others and in only a few are the greater number still alive. Observing the wasp capture her spiders shows for the most part that the stinging is done hurriedly and carelessly and upon any part of the victim's body, but some wasps place the sting with evident care and nearly always beneath the cephalothorax, or at the base of the abdomen.

Fabre, the Peckhams and others have experimented with the effect of wasp stings on spiders and certain true insects in order to show the paralyzing or deadly effect. With beetles, grasshoppers and caterpillars there is decided value in this, but as for spiders these investigators have overlooked a salient fact—the extreme and comparative lack of vitality. The mere stabbing of the needle-like posterior organ of defense and offense is sufficient to kill either outright or in a short time, without the poison. This may be proved by the insertion of the tip of a needle into almost any part of a spider's body. Out of sixteen spiders of various species stabbed quite gently with a slender insect pin fourteen died quickly, or within a few hours and two only partly recovered. The venom, while it does contribute to the fatal effect, is evidently of little use to the spider hunters.

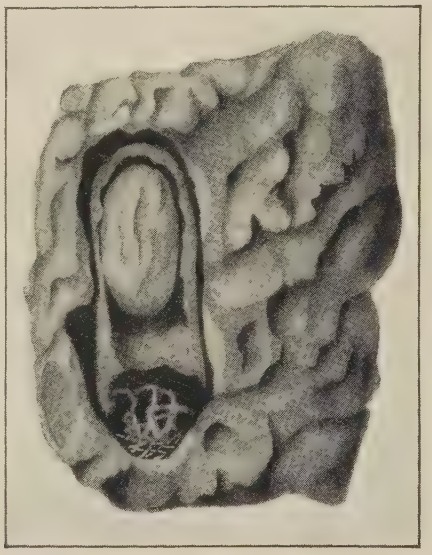
That the world is not covered with mason wasp clay nests and the spiders rendered extinct is due to that balance in Nature common with all species. With regard to these busy little workers in clay it is a matter hardly touched on, much less told in full. The creatures that interfere are two-fold: those that hinder and those that aid in an indirect manner the life-long proceedings of the mud daubers.

In a clay mass containing seven cells, five of them formed vertically on a wall with the sealed ends upright and two horizontally attached to the under side, three were found to contain the undisturbed larva of the mud wasp each in its parchment-like, yellow cocoon with



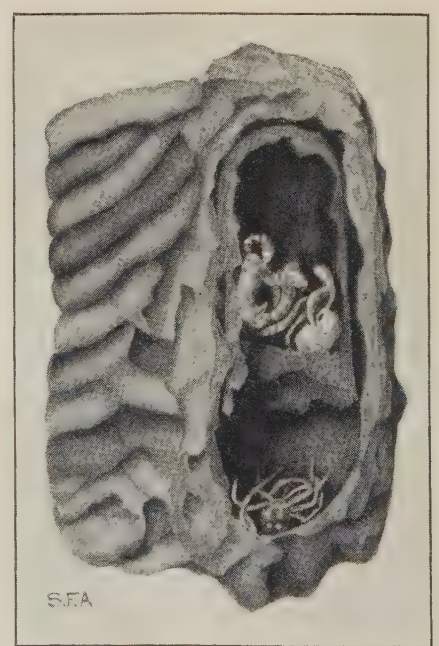
BLUE MASON'S NEST

Showing the cocoon of the white-footed wasp parasite



NEST OF THE BLUE MASON WASP

Showing cocoons of the parasitic white-footed wasp and within is that of the burglar bee



THREE CYCLES OF PARASITISM

Tachina larva feeding on the bee larva that has cut into the brown mason wasp's nest to destroy the interloping Trypoxilon

the inexplicable thick, black, attenuated end. In another cell there were eleven spiders partly eaten and the half-grown larva of the wasp lifeless, the microscope disclosing a minute mold or fungus, stalked and knob-like in character and variegated in color. To the scientist these vegetable growths attacking many kinds of insects and their allies are known as Empusa and Sporotrichum, forming a distinct group. The breeze-driven spores enter and lodge in the spiders, or are carried in with them and quickly spread, destroying also the rightful occupant.

In another cell there was no sign of the larva other than the thick, black end of the cocoon, showing that the insect had reached its growth and was ready to pass into the pupal stage. There was a mass of fine dust also, this condition being easily explained by the presence of two fat and well-contented, brown, hirsute, active larvae of that familiar and most unwelcome pest, the common carpet beetle or buffalo bug. Entering the cell when the wasp was absent the mother beetle deposited but two eggs on the collection of spiders and after the cell was sealed these hatched. Beside dining sumptuously upon the stored spiders the beetle larvae soon settled the fate of the slow-growing, lethargic wasp maggot.

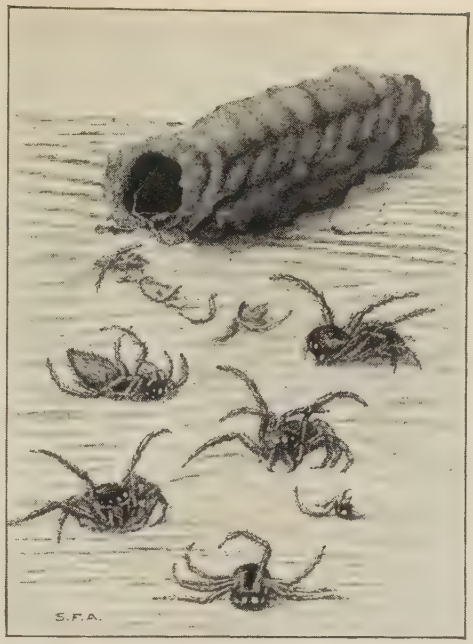
Another one of these cells in the center of the mass was thus infested with but one buffalo beetle larva and the store of spiders only partly eaten; the wasp larva was still alive, though doomed had we not interrupted the course of events.

But a more genuine case of parasitism will be disclosed. From one broken cell a small horde of fly maggots, the larvae of a *Tachina* (meaning swift of wing) was jostled out with parts of the spiders eaten by them and a portion of the wasp larva also. The author of this mischief had also entered the unguarded cell and deposited a dozen or more eggs, as she would have upon any live caterpillar or other

immature insect happened upon.

There is very often a mystery to confront us in these clay cells. Full-grown larvae of the mud wasps are found quite dead without any apparent reason for this condition and the microscope fails to disclose any evidence whatever, though very probably an exceedingly minute fungus, or some bacterial infection, is responsible.

During the late summer it is not unusual to note, flying about and frequently on or near groups of mud dauber nests, a resplendent insect all of golden-green with iridescent reflections, a creature not more than one-fourth of an inch in length, but of such a brilliant hue as to attract immediate attention. This is a gold wasp, or cuckoo bee, *Chrysis* (wearing a golden coat) *coerulans* (not well named specifically because more green than blue). It is one of a group of many species and genera all of which are probably parasitic. They are little things, swift of wing, easily avoiding the occasional dashes of the mud wasp and quickly returning to wait until the builder has departed for more spiders. Then they slip into partly stored cells and are almost immediately out again and away.



MUD CELL OF BROWN MASON

Showing the spiders that had been stored away as food

TWO MUD NEST PARASITES

The white-footed wasp on top lays an egg in the open nest and the mason bee below cuts its way in

Further examination of many cells bears out this more indirect observation. From an exceedingly small percentage recorded, the cells of the mason wasp under cover gave forth adult gold wasps of the species cited. One was discovered in the larval state.

Other surprises confront the investigator of mud wasp nests. In a nest of five cells of the blue mason wasp one was filled with undamaged spiders and a mysteriously dead *Chrysis* larva; two contained normal pupae of the builder, and two others yielded cocoons of very different character. These were hard, rigid, evenly cylindrical or slightly constricted in the middle with spherical ends and dark brown in color. From these in due time emerged wasps about the size of the mud dauber, but less slender and with much less restricted and elongated abdominal petioles, almost uniformly shining black, close inspection showing the tarsi of the hind legs to be entirely white.

It is not difficult to recognize this species, like the gold wasp boldly frequenting the region of mud wasp nests in late summer, passing in and out of the cells when the builder is absent, often chased away when the mason returns, and always showing little fear. This interloper is the white-footed wasp, *Trypoxilon albitarsi* (the generic name meaning wood borer, but in this case a misnomer, though allied species do use the borings of beetle larvae to store with spiders and leaf bugs, making no burrows of their own in any case). The larva of the *Trypoxilon* hatches from an egg placed among the stored spiders in a cell of the mason wasp nest and it feeds not only on the spiders, but on the ill-fated, immature mason wasp as well. The white-footed wasp is, therefore, a direct enemy of the mason wasp and an indirect friend of spiders and of mankind. No more beneficial creatures exist in the wild than the specifically and individually numerous Araneids.

This process of perpetuation is an easy one for the usurper. There is no nest to labor over, no hunting to do, not even the mud cells to seal up. The job is as simple as that of the cuckoo of the Old World and the cowbird of America. What, then, can limit the numbers of these interlopers, or prevent the extinction of all the mason wasps? Take it for granted that Nature directs the result of the preying, killing, usurping habit.

Looking a little more closely it becomes surprising

that investigators long since have not observed the little round holes filled with discs of different colored clay in the mud nests of the mason wasps, and have not surmised that a burglar, rather than a mere sneak thief or a trespasser, has been at work.

Break open a cell having this peculiar mark and within reposes a cocoon of the *Trypoxilon.* It has been broken open at one end and this filled solidly with a thick plug of the same clay that closes the once made hole in the cell wall. And the larva of the white-footed wasp no longer exists within; instead a small, gray-brown, ovoid cocoon crisply soft and within it a larva most surely not a wasp occupies the space behind the plug. From this in time emerges a dull blue, round-bodied bee largely covered with white hairs—*Osmia lignaria.* The generic name means an odor, though this little insect, not over five-sixteenths of an inch in length and half as broad, has no discernible smell. The specific name, as is so frequently the case, is another result of error, for the species, unlike several others of the genus, does not work in wood, but only in clay in order to close up its enforced entrances against further enemies that may damage its offspring. This species of *Osmia* has also been called a mason bee by those who knew them better.

Here is presented an apparent curiosity. Whenever the enforced infestation of *Osmia* takes place it seems to be only upon *Trypoxilon.* Wherever that interloper has inserted its presence the watchful little bee seems to know about it and, particularly in certain sections, gets busy long enough after to permit the *Trypoxilon* to have reached the pupal stage. Out of more than a score of cells bored into by *Osmia* I found always that the white-footed wasp had usurped the premises. But only once and then for the briefest moment before the bee was frightened away have I caught it at work cutting into the mud nest cell and, oddly, it did not come back before my patience was exhausted. Here, then, we have an insect that destroys an enemy of *Pelopaeus* and *Sceliphron,* thus indirectly aiding also in limiting the number of spiders and therefore it may be looked upon with some doubt by the agriculturist.

But we may extend our inquiries still further, not here to discover more parasites, whether friends or foes, but to record that among all of them there is a complicated criss-crossing of infestation. Thus the spores of fungus may drift in and destroy the larva of the gold wasp, the white-footed wasp, the *Tachina* or the *Osmia. Chrysis* may also infest the *Trypoxilon,* the bee and possibly the *Tachina;* the latter is no respecter of species, extending its parasitism to anything that will afford sustenance to its maggot-like young.

An extensive examination of the mason wasps' nests shows that the percentages of infestation average about one in four or five, though in sections it considerably exceeds this. Where *Trypoxilon* selects a cell in which to deposit her egg she is apt to hang round there and use each one of several as they are completed and stored. The same may be said of *Chrysis.* It is not surprising that the interlopers are generally successful in their nefarious efforts, for the mason wasps have to spend much time in hunting and often have to go long distances for the mud to seal up the cell. Is it not strange, however, that with their powerful scent organs they cannot detect the infesting eggs of the parasites?

Osmia also is persistent; discovering the hidden infestation of *Trypoxilon,* by scent alone, she proceeds to burglarize every cell in one nest before seeking others.

Nature does not always direct her efforts to produce the best results. It is evident that *Tachina* flies just emerging within the cells, also the fungous spores, cannot escape through the thick walls of the mud nests, though the spores may retain life until the cell walls become disintegrated. The fly, eager to deposit her eggs, foolishly enters that which will prove to be a prison death house to her offspring. With the developing white-footed wasp, the gold wasp and, of course, the *Osmia* it is quite different; their jaws are as strong as those of the newly-emerging mud dauber. And thus goes the story.

A FREAK TRILLIUM

BY WM. E. SHERWOOD

NATURE occasionally creates oddities which seem beyond man's power of comprehension. As, for instance, this trillium, *Trillium ovatum,* which Nature deprived of both stamens and pistil, but substituted petals in their stead. And so many petals! The first time I counted them there were thirteen. The next day—fifteen. Later on there were eighteen, and finally this flower could boast of no less than twenty dainty petals, all of the purest white. It seemed that the entire life aim of this flower was to produce more and more petals. Only maturity stopped their addition.

And to what purpose? Though it became an exquisite flower, yet its natural mission in life was lost. It might attract many more insects than any of its fellow trilliums, but it had not one grain of pollen to send away nor a single seed to be fertilized. It had no hope of posterity, and the energies, which would otherwise have gone to its offspring, were directed to its own self adornment.

We wonder why! Nature alone can give an answer.

THREE VERY YOUNG PLANTERS OF TREES ABOUT TO GO TO WORK

The idea of tree planting is early instilled in the minds of the youngsters

THE FEAST OF THE TREES

ANCIENT CEREMONIAL RESTORES HILLS OF PALESTINE

BY RICHARD ST. BARBE BAKER

Captain Baker is the moving spirit in "The Men of the Trees," an international tree planting group which had its origin in the inspiration given by an African tribe of tree-loving and preserving natives. Recently Captain Baker dropped in to talk trees and told us of his experience in Palestine. We enjoyed it so much we asked him to write it. Here it is—a most fascinating story.

MY RECENT visit to Palestine coincided with an effort that was being made locally to create interest in forestry. Under the patronage of His Excellency the High Commissioner Sir John Chancellor, I was able to co-ordinate the work and to form "The Men of the Trees" in Palestine, which needs trees.

There is perhaps no country in the world that needs them so much as Palestine or would so well repay the planting. The rain-washed slopes are bared of humus. There are no trees to retain the moisture in the soil and the water is lost in the Dead Sea or races down the wadis, the shortest way to the Mediterranean. What few trees remained at the outbreak of the World War were mostly destroyed by the Turkish army.

With the return of the Jews to Palestine there was a revival of national feeling, and closely associated with this is the planting of trees, the idea being that "he who plants in the land shall possess the land."

Last year it was my privilege to take part in a tree planting ceremony which falls at the end of January or the beginning of February—according to the Jewish calendar on the fifteenth of Shevat. This is known as the Feast of the Trees and originated in olden days when Israel was an independent nation living on her own land. Those were the days when each man sat under his own vine and his own fig tree. The essentially agrarian character of the people was reflected in the Law of Moses and gave rise to legislation characteristic of the land. One of the principal features of this was the Law of Allocation of Tithes. Every Israelite was bound to give

a proportion of his income, be it cattle or crops, to the Levites, who, "as servants of the Lord, could not amass this competence." These tithes were allocated at the end of the third year of the growing of crops and the Levites were the special custodians of trees.

Unlike other Jewish feasts which may be connected with purely historical or religious events in the annals of the People of Israel, the Feast of the Trees is purely a feast of Nature. It falls between the rainy season and the spring —the incomparable Palestinian spring which brings the land back to life. It is a day, therefore, when Mother Earth puts on her holiday garments and celebrates her own feasts.

During the long years of the dispersion this feast has been kept up, though in a somewhat different manner. It served as a remembrance of a glory that had departed and of the days when planting formed the chief occupation of the community. In the dark days of the Diaspora, Jews gathered into their houses fifteen different kinds of fruits and nuts grown in Palestine and distributed them to their children who ate them in family gathering, offering blessing to the trees. The simple feast

RETURNING FROM THE TREE PLANTING AT EVE

The children had celebrated the event and visited other plantings

CELEBRATING THE FEAST OF THE TREES IN PALESTINE

While the young people planted, the old men ate of the fruit of the trees

celebrated with quiet patriarchal dignity served at once as a reminder of the past and instilled into their hearts a ray of hope for the future.

Now with the return of the Jews to Palestine, this Feast of the Trees has been revived in its original form—that of tree planting—with all the force of national intensity. In the ceremony in which I took part last year, four thousand school children marched from the City of Jerusalem to a suburb called Bait-Vegan, meaning House and Garden. These four thousand school children had been delegated to plant trees along the sidewalks of this new suburb and they formed a procession with their banners and were accompanied by some sixteen thousand spectators. It was a wonderful sight to watch their procession, about four miles in length, and to realize, as a forester, that all this interest had been created in tree planting.

JEW AND ARAB MINGLE AT THE FEAST
They meet together to watch the children at their work of planting

At the entrance to Bait-Vegan, an arch of welcome had been erected bearing the inscription, "Welcome to the Young Tree Planters." They were a joyful crowd. The air was full with holiday spirit and as they marched they sang songs of the forest and of tree planting. After they had passed under the arch, the procession split into two streams, two thousand children taking up their positions along each of the two main streets of the new suburb. Before the tree planting actually commenced, a halt was called and the chief Rabbi and head of the suburb climbed up on a platform to make a speech of welcome after which there was no time lost in planting the trees. When their work had been completed, the procession disbanded and groups of friends formed picnic parties on the surrounding hills where they ate their lunch consisting chiefly of nuts and fruit and drank the wine of the country. After their repast, many of them visited the groves of former planting and some of them joined hands and danced around the trees. After the ceremony was over I went back into the city of Jerusalem and visited some of the old men who were keeping the Feast at home by eating the fruit of the trees. In one home for old men I counted fifteen different kinds of fruit and nuts on the festal menu.

Not only were these tree planting ceremonies taking place in the neighborhood surrounding Jerusalem, but all over the country in the Jewish colonies and settlements children of all ages were celebrating the Feast of the Trees. At Ben-Sheman I witnessed a similar tree planting ceremony in which five hundred school children took part. At the end of the tree planting bags of nuts were distributed and after a picnic lunch expeditions were made to parts of the forest which had been planted by previous generations of scholars.

I should like to be able to convey the festive mood, the enthusiasm which accompanies these tree planting ceremonies. It is not a drudgery or a task which has to be performed whether it is liked or not. It is a joyous occasion and everybody enters into the spirit of the moment. The panorama of these little pupils celebrating this feast of Nature by tree planting in the land of their fathers is picturesque beyond description. The jubilant voices of the children become a remarkable fulfillment of the divine promise to Rachel, the Mother of Israel, as recorded in the prophecy of Jeremiah, "refrain thy voice from weeping and thine eyes from tears for thy work shall be rewarded and they shall come again from the land of the enemy and thy children shall come again from their own border." Yet again we are reminded of the Nature of poets amongst the ancients who said, "The trees of the fields shall clap their hands. . . . . Instead of the thorn shall come up the myrtle."

A miracle is happening in Palestine today—in this land of historic interest and future prospect. All sections of the community are coming together for tree planting. Amongst the vice-presidents of the Men of the Trees in Palestine are His Eminence the Grand Mufti (President of the Supreme Moslem Council); His Beatitude the Latin Patriarch of Jerusalem; The Right Reverend the Bishop in Jerusalem and the Near East, the representative of the Greek Orthodox Church; the Chancellor of the Hebrew University, and His Worship the Mayor of Jerusalem. All these people with strongly differing religious views are coming together for the work of tree planting so that this ancient country, so full of sacred associations, may once again bloom as the rose.

Trees are an ever increasing need in the lives of the people and now that interest is being created in tree planting, the barren hills will be summoning forth their strength that remains and under the influence of sun and rain will once again yield their woodland harvest. Trees grow twice as fast in Palestine as in the North American continent. In Palestine we always have the sun; today it still brings comfort to the land, caressing it with its rays and keeping alive the hope that this land will yet be raised up to life and be an everlasting glory.

"From among the lichen-covered branches above comes the droning whir of a hummingbird"

THE GREAT MYSTERY

WHAT IS THE POWER THAT GUIDES THE CHILDREN OF NATURE

BY E. CHESLEY ALLEN

ILLUSTRATED BY R. BRUCE HORSFALL

LIKE an obscure byway cutting across the traffic of a great trunk route, so this little woodland road makes a cross-section of the mysterious late June tide of animal and plant activity that we call "life".

Along its borders, the rhodoras have shed their long purple petals; and already the green seed-pods are taking form and nourishing their treasures of tiny seeds. The rhodora's place in the color scheme has been taken by the clusters of rose pink kalmia saucers, each fitted with its circle of hair-trigger powder puffs, ready to dust the furry coats of insect visitors. Borne on the light June air, dandelion seeds, independent and serene, cross the road on far balloon journeys of perhaps one, perhaps a hundred miles; while clusters of willow seeds, clinging together by their light fluff, like timid children hand in hand, are off to unknown destinations, fortunate or unfortunate. Irises flaunt their blue banners and invite all insect guests that may have tongues long enough to probe their deep-throated nectaries. In the clearer spaces between the trees the clintonias have loosed their carillons of pale yellow bells; while hidden in the thickets, as if too shy to expose fully their rare charm, rose-veined moccasin flowers, most beautiful of all our northern orchids, are tempting wayward bees into their ingenious

"From the black silhouetted spires of spruce and fir float the vespers of hermit thrush and white throat"

traps, for only by this means can they set their seed.

Like super-flowers set free, butterflies zig-zag in apparently aimless flight up and down the road. Great yellow and black "swallow-tails"; little metallic "coppers" searching for a patch of sorrel; "white admirals" with purple-black wings crossed by wide white bands; "silver-spots" and pale "sulphurs"; late, faded "mourning-cloaks" and "tortoise-shells", hastening to sip a last drop of nectar before their wings become too frayed to permit further flight.

Across the gravel road-bed crawls a peculiar, long-legged black and yellow wasp. She is walking astride and half carrying, half dragging a strange burden which proves to be a slender green caterpillar of the measuring-worm type. Somewhere, back in that thicket from which she emerged, a tragedy has occurred. The caterpillar, feeding comfortably upon a green leaf, has been discovered by our wasp. A momentary poise, a sudden swoop; and the poisonous sting of the wasp has been deftly inserted into the struggling prey; often not at random, but at just the right point to secure the desired result—not death, but a paralysis which, while making the victim utterly helpless, permits it to live for many days. Within two minutes the wasp has crossed the road with her burden, crossed the deep gutter and entered the thicket on the other side. There is no lack of purpose in her movements. The powerful and insistent urge of reproduction is upon her. At times, faced by some obstacle, a stick, a stone, a clump of weeds, the task seems almost more than she can perform. She pauses, and her frail body palpitates with her respirations and the effort of her labors. Then on she goes. Short detours must be made about tree-trunks that stand in the way, but her general line is direct and without hesitation. What is her goal, and by what compass is she guided?

Farther and farther into the thicket she goes, and now begins the ascent of a low hill. Five yards, ten yards, twenty yards, without doubt or indecision. Near the top of the hill lies a huge block of granite, a three-foot cube, recently taken from the quarry. Her line of travel meets this barrier fairly midway. Its upright wall seems to present an impassable obstacle. Will she find her way around it, or give up in despair? Without hesitation she turns about, backs up its vertical surface, dragging her burden after

her, reaches the top, drags her load across, and, falling and flying, reaches the ground on the other side. Immediately her original course is resumed, yard after yard along the hill-top. Here the soil is of fine loam and gravel, and the travelling easier. Suddenly the wasp stops and drops her helpless burden. After the merest pause she begins to dig into the earth. In a few seconds she has disappeared beneath the surface. Presently she reappears, clutches her treasure once more, and, backing down her shaft, drags the caterpillar after her. In less than a minute she has reappeared alone, and immediately begins to fill in the excavation, carefully avoiding any coarser particles. It is quickly done, the surface nicely levelled, and she flies away, never to revisit the spot.

What does it all mean? Our prying irreverent fingers dig into the mystery. We find, a little more than an inch beneath the surface, not one caterpillar, but two; and lying between them the newly-laid pearly egg of the wasp. Had it been allowed to hatch, the tiny grub would have been assured of food, living and well preserved, to meet its growth and help it to complete its life cycle.

But what power drew the unerring line of this second journey which began somewhere in the thickets beyond the wood-road and, overcoming tree and log, stone and boulder, terminated at this exact spot? "Hereditary instinct"? A high-sounding phrase, but throwing little light upon this phase of the great mystery of "life."

Just down the road from the quarry we stop under an old maple. Presently, from among the lichen-covered branches above comes the droning whir of a hummingbird, no unusual sound in late June. But there is something unusual about this hum, suggesting alarm and menace; and in a moment an agitated bit of bird life dashes at our faces in frantic effort to drive us from what is evidently holy ground. Finding us quite stupid and impossible, she settles in a moment upon a slight enlargement of a branch just above our heads. Is it possible that this tiny knot can be a nest? Little more than an inch across, it is a perfect gem of workmanship. The little cup is built of softest vegetable down and covered with flakes of gray lichen, blending with those of the supporting branch; and lying within are the two eggs, so tiny and so fragile that to touch them would probably mean their destruction. Yet from these two eggs will presently emerge two bits of bird life, unbelievably small, naked, blind, short-billed and helpless. But not so for long. In a few days minute feathers will appear, eyes will open, wing quills with finest webbing will develop, and bills will lengthen. Suddenly the nest will be empty, and two other winged green mites will be probing the throats of the saucy-faced nasturtiums in our window boxes. But when late September brings its frosts, away they fly over sea, mountain and valley, for thousands of miles, to spend the winter among the groves and palm gardens of Central America.

By what manner of compass and chart is this long journey, never traversed before, accomplished by such wee voyagers? Why, when next May shall deck our northern maples with crimson bloom, may we with every assurance expect them back among their former haunts? By what guide or pattern will these younglings, still less than a year old, be able to duplicate in plant down and lichen and in exquisite perfection the nest in which they themselves were reared the year before, never having attempted such a task?

Again we may say, "hereditary instinct"; but again we realize the insufficiency of the term, and that our groping minds are baffled by the great mystery.

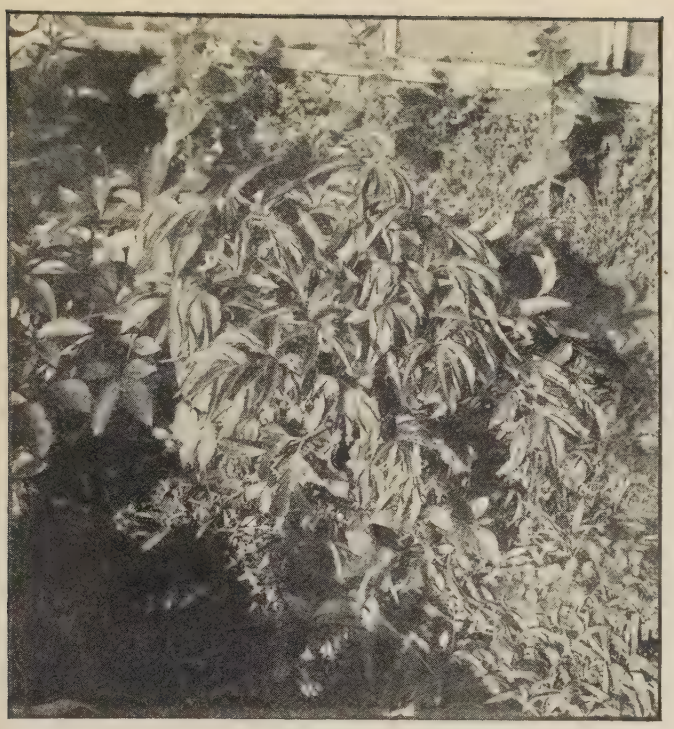
Night falls softly across the little wood-road. From the black silhouetted spires of spruce and fir float, in liquid gold and pure silver, the vespers of hermit thrush and white-throat, enrapturing but still unexplained. And, with the last note, the Great Dipper appears in its eternal cycle about the Pole Star.

These, too, bird melody and wheeling constellation, proclaim to all the presence of The Great Mystery.

THE RATTLER AT HOME

BY HARRY H. SHELDON

The rattler is an obliging subject. He will coil himself up at the slightest suggestion, he will rattle all over to the Queen's taste, he will even throw himself toward the camera, and incidentally, toward the photographer, so one can get a head-on view. The approved method of photographing his Rattleship, and the way in which this picture was taken, was quite simple. Stir him to a fury with a stick, so he will not have business elsewhere, and hold him in place while setting up the camera. As I did not have a tripod, I had to build a platform of sticks and rocks, and placed the camera twenty-eight inches from the infuriated subject, who kept considering me the object, and tried to reach me all the while. As he quivered in the shade of a fox berry bush, I snapped a five-second time exposure, using a portrait attachment. Following that, neither of us lost any time getting to other portions of the sovereign state of California, where we felt safer.



A WILT AFFECTED PLANT

Note the general drooping and curling of the leaves, caused by this disease

FOES OF THE PEONY

HOW TO FIGHT DISEASES THAT INFEST THIS PLANT

BY C. T. GREGORY

PURDUE UNIVERSITY AGRICULTURAL EXTENSION DEPARTMENT

THEY used to be "pinys" and everyone had a plant or two in the yard. There was no flower more hardy than the "piny" and every spring the great pink and red blooms covered the bush. But now that they have become the "peony" it almost seems as if culture and breeding have been too much for them. The peony has taken a permanent place in the home landscaping of today. Where yesterday a bush or two sufficed, today there must be great beds and banks of this beautiful flower.

When men begin improving a flower they needs must search the world for better and different kinds. This is a commendable practice and yet it is fraught with danger because it may lead to spread of many serious diseases and pests which destroy beauty rapidly.

We may consider our peonies as an example. There is a rather common trouble known as Les Moines disease that is said to have come from France. The affected plants are usually dwarfed and the leaves have a stiff upright aspect. To the touch the leaves are harsh and stiff and when moved they give forth a rattling sound rather than a rustle. The roots of such plants are swollen instead of having the sleek, slender appearance.

For such a plant there is no cure. Pull it up and destroy it rather than to run the risk of spreading the disease to other neighboring plants.

Another disease for which there is no control is the wilt. The affected plants simply droop. The leaves roll and assume a dead flat color that cannot be mistaken. Split the stem of such a plant and the cause of the trouble will be revealed. The sap tube tissues in the center are dark olive green. The fungus growing within the sap tubes has poisoned the water supply of the plant. Death is inevitable and there is nothing that can be done to help the plant. It might as well be destroyed, and the soil should be disinfected with formaldehyde before another peony is set in this place.

During the spring of 1929 in Indiana we received many complaints of frost or freezing injury to peonies. At first glance the trouble did look like frost injury. The tender new tissues were black and water soaked. But frost was not the cause of the trouble. It was the black

A BADLY DISEASED PLANT

The twisted, dwarfed stems result from frost injury, while the rotted stalk, in the insert, is due to Botrytis

NO BLOOMS ON THIS
For Botrytis has attacked both buds and leaves. To prevent, cut off old tops

PHYTOPHTHORA BLIGHT
Caused by a fungus similar to that bringing potato blight

Phytophthora blight, caused by a fungus similar to the one that causes potato blight. The cool wet weather of last spring was exceptionally favorable to this fungus and as a result it was rampant. Spraying with bordeaux mixture or dusting with copper lime dust would check this trouble but the difficulty is that it gains a foothold before we are aware of its presence. But, even though we do not stop the trouble it is always best to cut out and burn all the diseased branches.

Peonies may also be afflicted with several leaf spots as well as another kind of bud blight. One spot disease is purple in color on the upper surface of the leaf and olive brown beneath. This is caused by *Cladosporium peoniae*. Another kind is light brown in color, but with concentric rings in the diseased area. The fungus *Botrytis cinera* grows through leaf tissues into the stem and down into the root, causing a root rot. It will also attack and rot the buds.

The best control of these leaf spot and bud rot troubles is sanitation. Cut off and burn the tops of the plants late in fall. If some winter protection is needed for the plants, use straw but do not leave the tops nor any of the dead leaves about the plants. These various fungi are harbored in the old stem and leaf tissues during the winter. In the spring they resume active growth and spread to the new leaves and buds. Cleanliness in the peony bed is of supreme importance.

Sometimes when peonies do not blossom it may be because they are planted too deep. The eyes should not be more than two or three inches below the surface. But sometimes the failure to blossom and the general debility of the plant is due to nematodes attacking the roots. Dig up the plants and examine the roots for swellings caused by these worms. If this is the cause then cut off the infested roots, dip a few minutes in a one percent solution of formaldehyde, replant in a new place and fertilize the soil with bonemeal.

Oyster shell scale insects may infest peony stems. In summer it is possible to kill them by spraying with one of the miscible oils, using one part in forty parts of water. However, cutting and burning the infested stems is another effective means of getting rid of this pest.

The cleanest peony gardens I have seen have been kept so by cutting the tops and removing the rubbish in autumn. Some growers will spray the plants with lime sulphur, 1-50, two or three times during the growing season. However, if but one thing can be done let that one thing be to cut and destroy the tops in autumn.

By now you have doubtless discovered that color pages have returned to Nature Magazine. Every other month—for a time, at least—four pages will be devoted to the reproduction of R. Bruce Horsfall's paintings. The abandonment of color last year was regretted and came about only because of the expense, which is a considerable item. We appreciate the comments of our members and readers who expressed hope that we could restore the colored pages. After much careful figuring we felt that this could be done, and Mr. Horsfall is now at work completing pictures in color of all the North American Birds—a task, indeed, but something much needed

EDGAR T. WHERRY

PLANT PROSPECTOR

BY ALMA CHESNUT

It has been said of Dr. Edgar T. Wherry that he is one of the most versatile scientists in Washington. In an age of overspecialization he has played a rôle of a scientific jack-of-all-trades, delighting in curious explorations along the borderlands between sciences. Master of many sciences, but recognizing science in its larger sense alone, Dr. Wherry is constantly turning up unique and pertinent bits of information that would have been overlooked by a man of less diversified talent.

To many he is known as a botanist, an unquestioned authority on native wild flowers, sponsor of red, white, and blue phlox as national emblem, and an ardent conservationist. He is constantly in demand as a lecturer before garden clubs in the different eastern states, and many a charming wild garden, tucked away on rich estates among beds of sophisticated blooms, owes its fragrant being to the love he creates in his hearers for these shy forest flowers. By his college training, however, Dr. Wherry is a chemist. He is also a geologist, mineralogist and crystallographer. He pooled the knowledge he had gleaned in all of these fields for his important studies of soil acidity and the relation of soils to the distribution of native plants.

TIDEWATER PINK TURTLEHEAD
Rediscovered by Dr. Wherry after being lost to science 175 years

Dr. Wherry began his career in Philadelphia, his native city, where in the fall of 1902 he matriculated at the University of Pennsylvania. He was fortified with a tuition scholarship, won by competitive examination, but was obliged to work during his vacations to earn money for his incidental expenses. One summer he presided over a drug store counter; another he worked as an unskilled laborer in a commercial museum, packing and un-

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packing specimens. The job did not matter to this tall, serious young person; he had decided to become a chemist. Upon graduating he taught at Lehigh University, likewise continuing his studies and qualifying as a Ph. D.

One phase of chemistry particularly attracted him—the identification of compounds and minerals by their crystalline form. Each substance has its own characteristic crystal, different from all other, and the beauty and symmetry of the multiform shapes fascinated him. As he always does when a new field beckons, Dr. Wherry plunged whole-heartedly into crystallography and, again as usually happens, he emerged with important new scientific data. He became known as one of the foremost authorities on the subject in the United States and has done valuable work in identifying crystals by means of optical instruments.

STARS OF MOSS PHLOX

Dr. Wherry's choice for national flower is the genus Phlox

His outstanding work in crystallography brought him appointment as assistant curator of mineralogy at the National Museum in 1913 and, subsequently, to the post in the Bureau of Chemistry and Soils which he still holds. It was while he was with the museum that Dr. Wherry built up his reputation as an authority on gems. He was constantly called upon to identify them and assisted in the compilation of a standard "Handbook and Descriptive Catalogue of Gems in the U. S. National Museum." His interest in gems has continued. Recently publicity has been given to his favorite method of identifying colored stones, such as the ruby, emerald and sapphire, by means of their rainbow patterns when examined under a micro-spectroscope. A micro-spectroscope, he explains, is simply a microscope with a spectroscope inserted in the eye-piece. The method supplements time-honored tests now employed by gem dealers. It is absolutely dependable, obviates all danger of injuring the stone, and does not require removal of the gem from its setting.

SILENE WHERRYI, A CATCHFLY

A species discovered by Dr. Wherry and named for him

Most mineralogists, when they go prospecting, seek rare metals and rocks. Dr. Wherry, while engaged in strenuous microscopic work, went prospecting for plants by way of relaxation and diversion, indulging an early interest in the distribution of native plants and their relation to various soils. So far afield did he ride his hobby that soon the hobby became his principal work. Botanists, hearing of his work, pricked up their ears and welcomed him to their sacred circle.

Dr. Wherry tells how his interest in such matters began when he was a college freshman. During his rambles in search of minerals near Philadelphia he noticed that a certain species of phlox grew only on a mineral known as serpentine. This lovely wild flower, tinted a brilliant purple pink, covered, he states, acres of ground, growing always on the same rock so that geologists depend upon it in making maps of that region. In other places it had adapted itself to

different soils, but its obvious preference for the rock interested and puzzled the young student.

Some years later, when he had launched his studies of soils, Dr. Wherry found that this species was not attracted, as many plants are, by a particular chemical constituent in the rock, but, rather, by the lack of them. Upon analysis the soil over serpentine rock was revealed to be unusually sterile, lacking in nitrogen, potash and phosphorus. This phlox, unlike most plants, prefers such a setting.

CARPET OF PHLOX SUBULATA
This started Dr. Wherry studying soil acidity

In advocating the selection of phlox as the national flower, Dr. Wherry points out that many of the plants currently suggested are European species, which are not native to this country at all. The rose, he states, which has received the greatest number of votes in the American Nature Association contest, is the national flower of England, and its selection seems to him highly inappropriate because of this fact.

Studies of ferns showed that certain species grew in soils of widely varying chemical character, but consistently associated with a particular type of rock. Some preferred limestone and were classed as calcareous soil plants; others avoided calcareous rocks and were classed as acid soil plants.

THE ACID SOIL ONION
Discovered by Dr. Wherry in his studies of soil

Dr. Wherry has traveled many thousands of miles as a botanical prospector and, in the last quarter of a century, has visited every state east of the Mississippi River and some western states as well. He has known the thrill of discovering or rediscovering about twelve new species of plants and the excitement of being under suspicion as a "revenuer" in mountains that shelter stills as well as rare flora. His advice, incidentally, to naturalists likely to encounter moonshiners, is, "Be polite and honest. Explain your business frankly and the chances are that the moonshiner will give you valuable advice or even offer to help you."

An old Chevrolet sedan, dubbed "Chevy of Chevy Chase," has furnished transportation for many of Dr. Wherry's expeditions into the wilds. He has devised a unique way of camping out in it and often spends a month on the road. The only extra equipment needed, he states, is a couple of blankets. He buys his food along the way and has no use for a tent since the automobile can be quickly and easily converted into a comfortable bedroom. The two cushions from the back seat are arranged lengthwise in the car. These make contact with the front seats, whose tops are pushed back, and the result is an extremely comfortable spring mattress bed. Two people can easily camp out in such a fashion, and the pleasure of such trips is increased by taking a companion along. Dr. Wherry remembers many happy expeditions with Harry W. Trudell, J. E. Benedict, Jr. and other naturalists.

It was mounted upon "Chevy of Chevy Chase" that Dr. Wherry, accompanied by W. W. Diehl of the Bureau

of plant Industry, went "chasing Chelones" through Virginia, West Virginia and the Carolinas in the fall of 1926, and a year later with Dr. Francis W. Pennell, of Philadelphia, the foremost authority on this plant family—whirlwind trips, full of scientific thrills. The Chelone, or turtlehead, is an autumn flowering herb, varying in height according to the species and bearing white, pink or purple blooms. The incentive of the trips was the rediscovery two years earlier, near Hills Bridge, Anne Arundel County, Maryland, of the purple species called *Chelone obliqua* which had been lost to science for 175 years.

To identify the plant beyond a doubt as the species first described by John Clayton of Virginia in 1743, Dr. Wherry first went to Soles, Mathews County, Virginia, and, near the site of the old Clayton homestead, found the plant that must have been the original *Chelone obliqua.* Then Chevy's nose was pointed westward in search of other chelones and soon the plant hunters had added to their laurels. In the course of the two trips three long-lost plants were discovered, one entirely new species and a distinct and unusually beautiful variety of *Chelone obliqua.* The latter plant, found near Brevard, North Carolina, grew to a height of eight feet and was loaded down with beautiful large flowers of varying pink to purple hues. Dr. Wherry named it *Chelone obliqua erwiniae* for Miss Katherine Erwin who assisted in finding it.

Other finds on such trips have included a colony of the rare orchid *Spiranthes ovalis* Lindley, in Indiana, a new catchfly, named for its discoverer *Silene wherryi,* and *Allium oxyphilum,* a welcome addition to any rock garden with its sunbursts of white or delicately pink blooms. It was Dr. Wherry's searches that led to the rediscovery of the box huckleberry, for a time thought by scientists to be on the verge of extinction.

How Dr. Wherry has applied the principles and methods of physics, chemistry and geology to the solution of problems of botany, plant distribution and horticulture forms one of the most unique chapters in modern botany. His uncanny ability to locate rare plants in unknown woods and to persuade them to grow in his garden when they will grow for no one else, frequently hinges on his knowledge of mineralogy. In some instances he has actually used maps prepared by the Geological Survey as an aid in making a rare plant find.

His notes on various plants give, in addition to the usual minute botanical descriptions and the location of the plant, a concise description of the soil in which it was found. It is neutral, circumneutral, acid, subacid, mediacid or minimacid, he will specify. When an interesting plant is located one of the first things the investigator does is test the soil about its roots by means of laboratory indicator dyes which change color much as litmus papers do, revealing the degree of acidity. Equipped with the knowledge thus attained he can adapt soils to the needs of plants by introducing elements that are lacking in their new location.

At his home in Chevy Chase, Washington, Dr. Wherry has a small garden which he describes as "very unpretentious", but this small garden is one of the most interesting to be found near the Capital. In it the visitor finds growing peacefully "in captivity" plants that he has known only in the woods. About three hundred different species grow side by side, but in soils of widely varying composition, under the watchful eye of the scientist. If one seems to be languishing, losing its healthy green color, up it comes to be transplanted to a different setting. Thus, by careful experiment, the ideal type of soil is ultimately found.

Obviously, the experiments have a commercial value. Rhododendrons, azaleas and arbutus, now much in demand as garden plants, could not be grown by some nurserymen, often turning yellow and dying under cultivation. Working in collaboration with Dr. Frederick V. Coville, botanist of the Department of Agriculture, Dr. Wherry located the trouble. The plants wanted a decidedly acid soil. Old sawdust, left to rot near sawmills, or peat from European bogs, is now added to the soil and the beautiful plants flourish and blossom.

It is difficult to estimate the value of such studies to horticulture. In European and Asiatic countries, Dr. Wherry points out, experiments in soil reactions are being extended to crop plants with very interesting results. Dr. Wherry, who is known everywhere for his work and is keenly alert to its value in this field, is continually being called on for advice in connection with such studies, which promise to be of great importance in agriculture helping to put it on a scientific base.

With the presentation of the Nature biography of Dr. Wherry we have already published several articles in this series. The editors would deeply appreciate any expression of interest on the part of our readers in articles of this character. Are you interested in Nature articles from the point of view given in this series? Have you any suggestions as to such a series and people you would like to see included in it? Have you any other suggestions or comments about the editorial contents of Nature Magazine? Please let us have them

CRICKET FAIR

CURIOUS FLORENTINE CUSTOM ON ASCENSION DAY

BY W. A. YOUNG

ILLUSTRATED BY HERBERT AND HELEN WILLIAMS

WHEN Christ was ascending to Heaven a cricket sprang upon the big toe of His right foot and was carried up with Him. This legend, peculiar to Florence, is believed in as firmly to-day as in the Middle Ages and is the cause of a quaint custom.

For a week before the "Festa" crickets are sold at every street corner of the city. From inside their tiny cages, so cleverly made from rough cane, the insects gaze intently at you—wondering at this sudden captivity, and little knowing that their first moment of freedom will decide your fate for a year.

Every good Florentine, rich and poor, religious and agnostic, will have his own pet "grillo" which he looks after with the greatest care. It must be kept in as good training as any athlete, and life-long misfortunes would fall upon the man or woman or child whose cricket dies before the trial.

Whether Ascension Day dawns wet or fine, when Mass in the beautiful churches of Florence is over, the crickets are taken to the Cascine, a narrow strip of public gardens running along the banks of the gray-green Arno. Their owners come in cars or "carrozzas" or on foot, and the insects seem at last to realize their all-importance and shrill loudly in chorus, making merry, festive music.

The scene is a gay one. Along the main walk are booths and hawkers with multi-colored balloons and streamers, beads, sweets, hot dough-nuts made while you wait, and above all crickets of every description, from live ones to terrific artifices of paper and wire that twitch all over as if they had the palsy.

However, scarcely anything tempts even the youngest members of the good-natured crowd of Italians and foreign visitors until the chief business of the day is over. Families and friends with their precious caged burdens break away and settle themselves in little groups under the willows and dark ilex trees.

Then amid some bantering and betting but much real trepidation the cage door is opened and the prisoner put on the ground. If he springs ûp joyfully into the air you breathe again—you will have health and prosperity for the whole year. But should he crawl away among the grass blades, ill luck will be yours until next Ascension Day.

The superstition is so strong that lovers will even put their betrothal to the test in this way, and the owners of an earth-bound "grillo" will in many cases not dare to brave an unhappy and childless marriage. Thus does an innocent insect decide for good or ill their destiny

WHAT SAY?
Did I hear a rumor regarding food on the wing?

A SNUG HOME

THE KINGLETS' APARTMENT PROVES TO BE IDEAL

BY CORDELIA J. STANWOOD

THE NEST
Here kinglets are as snug as a bug in a rug

SUCH a snug little nest it was! From the sunflecked woodpath it looked like a small green ball suspended from the pendent twigs of a spruce. Though the northern Maine May morning was chilly, discomfort was forgotten in watching two tiny olive-green birds flit in and out of the tree. Kinglets—they were golden-crowned kinglets! And quite unafraid did they seem to be at my presence as they regarded me from every angle. The father bird favored me with his "ti-ti" notes. The mother bird twittered unceasingly.

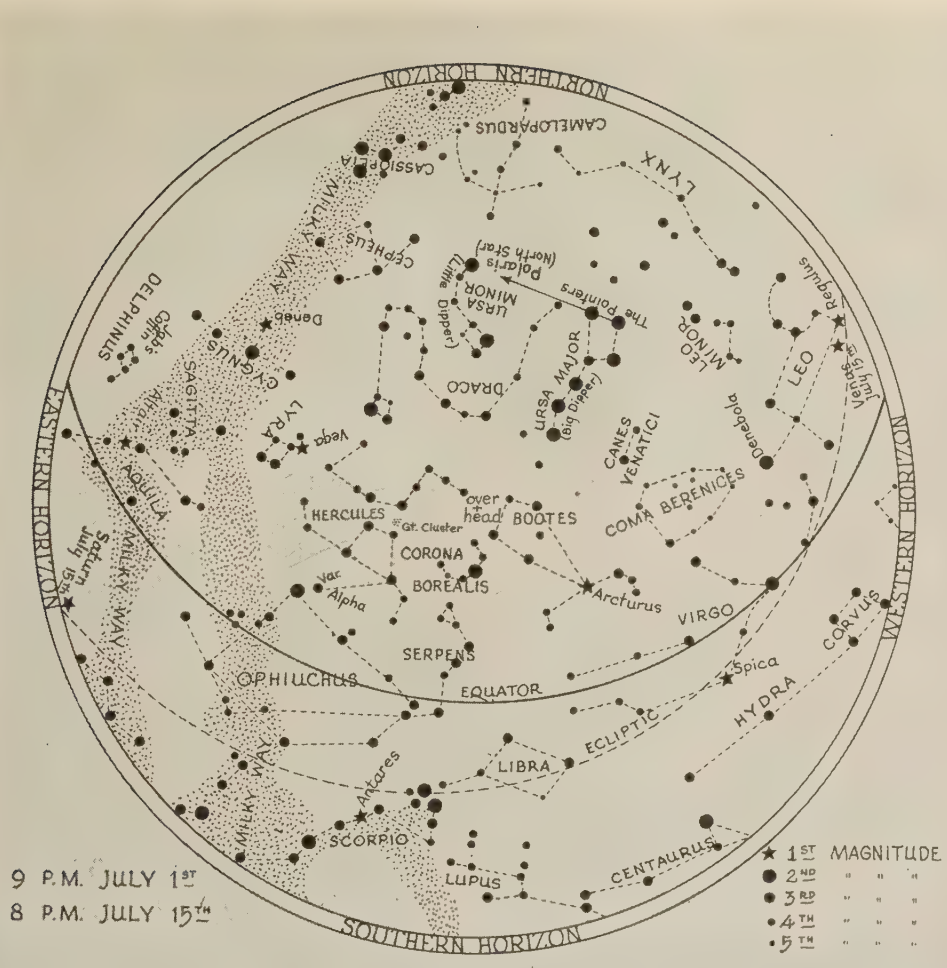
The birds were olive green with markings of white. The father bird jauntily flaunted a flame and yellow crown patch. The mother bird, more demure, contented herself with a saucy head-dress of yellow. But as pretty as they were, their nest was even more wonderful. Spherical in shape, perhaps four inches in diameter, constructed of fine shreds of green moss, bits of lichen, and fluffy masses of animal silk, this nest blended perfectly with the dense foliage of the spruce. The interior was cozy and warm, lined with gray lichen and red squirrel hair. In fact, the interior resembled a fur mitten turned inside out. Such a warm cozy crib for the expected babies to cuddle down in. And not content with this masterpiece the mother had placed downy partridge feathers vertically around the nest so that their tips encircled the top, leaving an opening of only about an inch.

One glorious morning ten tiny white, brown-marked eggs were cradled in the swinging nest. Just as I arrived the father bird had called his lady-love away for food and exercise and I had a good view of the interior of the home. Later I saw him bring food to his mate as she patiently brooded over the babies.

Eagerly I watched the royal family, and one morning was rewarded by finding ten baby birds. They were about the size of bumble bees, and only a mother—though possibly a father—could have seen beauty in them. Naked, blind, with a few tufts of grayish down, they indeed needed the soft comfort of that fur-lined mitten of a dwelling place.

Then for days I studied the ways of kinglets, big and small. A signal—it seemed to be jarring of the twigs or a sound too delicate for human ears to distinguish—and instantly ten little palpitating bodies were raised and ten tiny mouths of a vivid peach color opened inconceivably wide to receive the regurgitated food which the parent birds had partly digested for them. When the gold crest babies became larger their diet was changed to fat, luscious moths, juicy caterpillars or other delectable tidbits of the North Woods. And how they grew! And how they ate! It took the combined efforts of father and mother to appease the voracious appetites of the youngsters. But both parents had true New England consciences and their duty to their offspring was not neglected. Even after eight weeks when the babies could fly and when most feathered folk would have left them to fend for themselves, the kinglets tenderly and industriously cared for their family and instructed them in the proper behavior of well-brought-up members of the species. At this age the little ones though gray and frowzy began to give promise of the beauty and grace later to be theirs.

THE YOUNGSTERS WATCH THE CAMERA'S GLASSY EYE



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

SOME STELLAR CELEBRITIES

BY ISABEL M. LEWIS

STARS, like people, differ greatly one from another. In size and weight and general appearance they are different, and, again like people, they behave strangely at times. What of some of these more interesting and remarkable members of the stellar family?

Nearly everyone has heard or read of Sirius, Alpha Centauri and Betelgeuze. Sirius is unexcelled among the stars in apparent brightness, while Canopus is a fairly close rival. Alpha Centauri was, until a few years ago, universally known as the nearest star but now we must qualify this statement by saying the nearest *first magnitude* star. A little tenth magnitude star in the same constellation, known as Proxima Centauri, has robbed it of its glory by a matter of some billion miles. Proxima is approximately four-hundredths of a light-year nearer to the earth than Alpha. It is traveling through space in the same direction and at the same speed and is probably a distant companion of the brighter star outshining it.

Betelgeuze is the super-giant star that became famous a few years ago when its diameter was measured at Mt. Wilson with the Michelson interferometer. It was found to be large enough to fill most of the space within the orbit of Mars were it to take the place of our sun. Betelgeuze was soon to be eclipsed in fame. Another one of the red giant stars, Antares in Scorpio, was found far to exceed it in size with a diameter of approximately four hundred and fifty million miles, while Alpha Herculis has a diameter of four hundred million miles.

Betelgeuze is an irregularly variable star, however, and apparently irregularly pulsates, or expands and contracts, so that it is variable in size. This accounts to some extent for the conflicting estimates of its diameter which vary from 215,000,000 to 300,000,000 miles. For this reason also Mira, or Omicron Ceti, is estimated to be larger than

Betelgeuze with a diameter of about 300,000,000 miles. It is a strange property of these red giants that they are flimsy nothingness, almost, when it comes to density. Betelgeuze is composed of gases that have less than one-thousandth part of the density of air at sea-level and owes its brightness to its enormous surface area. In common with all the red giants its surface temperature is low, averaging only about 3,000 degrees on the absolute scale as compared with about 6,000 degrees for our own sun and about 16,000 degrees for Rigel. By far the hottest of all the stars are the peculiar Wolf-Rayet stars with temperatures between 35,000 and 40,000 degrees Absolute.

Sirius, which is a comparatively near neighbor, only nine light years distant from the earth, owes its remarkable brightness to its nearness to us. Were it as distant as Canopus, Rigel or Deneb Cygni, which is the first-magnitude star in the Northern Cross, it would be quite insignificant. The three stars just named are intrinsically the most luminous of stars. The distance of Canopus is estimated at about 650 light years and its light-giving power is believed to be equal to that of 80,000 suns such as our own. Rigel, which is one of the Orion stars, at a distance of over 600 light years is one of the super-giant stars of the universe and although less luminous than Canopus is the equal of 20,000 suns in brightness. The giant Deneb also over 600 light years distant from the earth is but slightly inferior to Rigel in brightness.

Strangest of all stars are the little white dwarfs. Three of these, namely, the companion of Sirius, a little star known as 40 Eridani, and a very faint star close to the earth known as Van Maanen's star, are mere planets in size, the last named being, in fact, smaller than the earth. Yet they are much hotter than the sun and composed of matter of inconceivably great density, forty thousand times denser than water, two thousand times denser than the heaviest known element! A pint of such star-substance would weigh several tons. The explanation given by Eddington of the tremendously high densities of these tiny stars is that they are composed of atoms that have been stripped of their electrons. They are undoubtedly among the strangest of all celestial bodies.

Many of the most remarkable stars are near neighbors of the earth. The faintest known star, intrinsically, is a little star known as Wolf 359 which is only eight light years distant from the earth and has less than one-ten-thousandth part of the light-giving power of our own sun. It would take eight hundred million such stars to give as much light as the super-giant star Canopus!

Other remarkable stars are the "runaway" stars, as they are sometimes called, which are moving across the line of sight at extraordinary speed. The little star known as Barnard's star is the star of largest "proper motion", which means motion across the sky at right angles to the line of sight. This little star is moving so fast that in twenty-five years, were it visible to the naked eye, the difference in position could be detected with the unaided eye. This is all the more remarkable since the *average* motion of stars across the line of sight is such that it could not be detected in the change of the star's position by the unaided eye in a thousand years. A remarkable pair of stars, known as Washington 5583 and 5584, are speeding together through space at the extraordinary velocity of 375 miles per second.

In the southern hemisphere in a strange, nebulous region of the Milky Way is one of the most curious stars in the heavens. It belongs to that fine southern constellation of Argo Navis and is known as Eta Argus, or Eta Carinae. Carina is the Latin name for keel and refers to the keel of the ship Argo. Because of the huge size of the constellation it is divided into Carina, Puppis and Malus. Eta is a deep red star and a most peculiar variable. At times it has been as bright as Rigel and even on one occasion as bright as Sirius. It has been said that nothing is so certain about this star as its uncertainty. It is never known what it will do next. Normally invisible or faintly visible to the naked eye it may suddenly acquire for some unknown reason several hundred or possibly thousand times its normal brightness and shine forth among the most brilliant gems in the sky. It is suspected that its erratic behavior is in some way associated with the nebulosity which surrounds it. Certainly this star at least can be attended by no planets which support life, for the sudden outbursts of intense radiations of light and heat would instantly annihilate all forms of life on its planets if such ever existed.

Another most remarkable stellar object is the sextuple star known as Theta Orionis. Four of the six stars that form this system are referred to as "The Trapezium" in the heart of the Great Nebula in Orion, the finest object of its kind in the heavens. It is now suspected that this fine family of stars may be the source of the great nebula itself and that they may be in some strange way puffing out into space their own star-substance in the form of surrounding nebulosity. Intensely luminous stars are frequently associated with gaseous nebulae and though at one time it was believed that stars evolve from nebulae it is now suspected that the contrary may be true and that the nebulae are formed rather from emanations from intensely hot stars. It is almost invariably such stars that have nebular surroundings. Theta Orionis is undoubtedly the most remarkable of all stars in this respect, with the possible exception only of the stars in the Pleiades group.

Our small list of unusual stars is far from a complete one. Not only are there many more remarkable stars which we cannot even name in such brief space but there are in addition many strange and interesting star clusters and groups and peculiar nebulous formations. Among these are the so-called planetary nebulae and nebulous rings with bright central stars such as the Ring Nebula in Lyra. The nature and origin of these odd formations are included among the still unsolved problems of the heavens.

Among the planets this month Saturn will be in Sagittarius, and on July 1 it will be in opposition with the sun and visible all night. Venus is now a fine evening star in Leo. On July 15 it will be very close to Regulus in the Sickle in Leo. Jupiter is now in the eastern morning sky but is too close to the sun to be seen this month.

Mercury is also too close to the sun to be seen in July.

Mars is now in Taurus and on July 15 is a few degrees southeast of the Pleiades. It will be found in the eastern sky before sunrise. It is now nearly as bright as Aldebaran and resembles it in color. It will increase steadily in brightness during the summer. It is approaching the earth but will not be in opposition this year.

Scorpio is now conspicuous in the southern sky. Antares, its deep red, first-magnitude star, is now approaching the meridian in the southeast. This star has a diameter of approximately 400,000,000 miles and is the largest of the super-giant stars. The Milky Way in Scorpio and Sagittarius is exceptionally beautiful. Its course across the eastern sky can be clearly traced this month and next. It is in Cygnus that it divides so sharply into two branches, one passing through Aquila to Sagittarius and the other through Ophiuchus to Scorpio.

The beautiful little circlet of stars known as Corona Borealis is now nearly overhead. Bootes lies directly west of Corona and Hercules is next to it on the east. The three, first-magnitude stars, Vega, Altair and Deneb Cygni are now well in view in the east. Spica in Virgo will be found in the southwest and Arcturus is due west of the meridian. The Big Dipper is still high in the northwestern sky. Draco is now conspicuous north of the zenith with his head beneath the foot of Hercules and the long line of stars that outline the body and tail easily traced to a point between the Pole-Star and The Pointers.

NIGHT-HAWK YOUNG

BY MRS. BRUCE REID

DURING the past few years, several generations of night-hawks, who have found the shelled roof of an enormous warehouse near Port Arthur, Texas, the ideal nesting place, have learned to grow used to human beings. Each group of nestlings, as soon as they were two or three days old, became familiarized with handling. They learned to accept food from human fingers as quickly as from parental bills, and ran with impartial haste after either their actual or their foster mother until they began to fly. With the development of their wings, they came circling down at the call of "Bullies! Bullies", just as at the cry of their own kind. The birds pictured here represent the third generation that have grown used to intimate human association.

The young of night-hawks are most peculiarly marked about the head. A dark spot at the inner corner of their eyes gives them the appearance of being wide awake when sound asleep. Back of the false eye is the apparent blackish bar that is really the closed true one. This is an ideal safety-first device, as most forms of prey would deem it futile to try to creep up on a bird that evidently was watching every move.

The friends of the night-hawks are anxiously waiting for another season, which will determine whether the family will continue to return to the warehouse and make friends with their many understanding human neighbors.

FAST ASLEEP, ALTHOUGH THEY LOOK AWAKE
The third generation of night-hawk young to grow accustomed to human handling. The black bar shows the actual location of their eyes

THINGS TO THINK ABOUT

A PAGE DEVOTED TO CONSERVATION FROM VARYING ANGLES

Missouri Bobwhites

We congratulate Missouri on taking a step toward a movement to keep pure from contamination the blood of her native bobwhite. From "Missouri Game and Fish News", February, 1930, we quote the following: "For the present time, at least, we are not purchasing the Mexican quail, as we have found them much smaller than our native stock, very hard to acclimate, and almost impossible to set with dogs. We believe that insofar as is possible our efforts should be expended on propagating our native bird".

We wish this movement to discourage the importation of foreign species of game birds and animals would spread. In many of our eastern states our native species, especially quail and rabbits, are being injured, and even endangered, by importations of inferior and often diseased stock from other sections.

Steel Trap Legislation

We are glad to note in an editorial in *The Sportsman* for March many good words in favor of the "Anti-Steel Trap" bill then before the Massachusetts Legislature. We quote: "This bill is not, to our mind, an ideal piece of legislation. Instead of outlawing altogether that vicious and barbaric implement, it permits the employment of any kind of trap, cruel or humane, within fifty yards of buildings or cultivated fields—an obvious sop to the farmer vote. But, with all its defects and loopholes, the bill is a step in the right direction; it applies—to a certain extent—those principles of humanity to wild creatures which for years have shielded domestic animals from the greed and cruelty of man. And, like every measure destined to protect the weak at the inconvenience of the strong, it is bitterly opposed by selfish interests. . . . As far as the steel trap is concerned *The Sportsman* regards it as wholly indefensible. If our sport depends on the employment of prolonged torture, we must do without sport".

The Sportsman especially decries the opposition to the bill by certain prominent sportsmen's organizations, whose "efforts would be more happily exerted if they forgot to look upon all predators as vermin. . . . The fact that, like so many similar organizations in this country, their preoccupation with their own immediate problems and programs blinds them to the interests of conservationists and sportsmen as a whole is the excuse for this editorial".

A Changed Viewpoint Needed

This is from California *Fish and Game*, October, 1928: "The pioneer hunted game purely as a meat supply. Later there were days when markets were stocked with every sort of game. In order to save wild life resources, it became necessary to stop the sale, and add numerous restrictions on the taking. At present, a changed viewpoint is necessary. Everyone must admit that the greatest usefulness of game is not to be found in its meat value, but in its recreational value. Furthermore, it is coming to be recognized that the mere presence of wild birds and animals is an asset. If, with changed conditions, we place a different valuation on game, there must be modification of its care. Every citizen of the state has a right to assume ownership. Each has a right to have a hand in game administration. Wild life resources must be administrated in a progressive manner coincident with changing conditions. Fifty years ago, game was considered useful only to those who killed it for food; today game in some places has a usefulness to those who would go out and see it alive in the open. Proper utilization will come only when study has revised the importance of each contributing factor."

Late Nesting of Doves

In most of the southern states the sportsman may shoot mourning doves during September to the number of twenty-five each day. It has often been pointed out that shooting doves at this season is a cruel practice, since many of the birds are then caring for helpless young which must perish when their parents are killed.

From a correspondent formerly resident at Norman, Oklahoma, and well known for her careful study of the mourning dove, we have received the following notes on September nesting. Most of these nests were found on the campus of the University of Oklahoma, in an area of 120 acres.

In September, 1919, there were 28 nests occupied by eggs or young; in September, 1920, there were 14 occupied nests; in 1921 there were 8; in 1922 there were 12; in 1923 there were 8; in 1925 there were 44; in 1926 there were 22. In many cases nesting continued even into October.

Remember that similar conditions exist in all the southern states, and imagine for yourself the aggregate misery inflicted on this innocent and useful species by the slaughter of parent birds. Then ask yourself this question—"How much longer shall we allow mourning doves to be legally killed at a season when so many of them are nesting?" The answer to this question depends entirely on the amount of effort that is expended by the Nature lovers and other friends of this gentle bird. They may continue to allow a selfish minority to fix the seasons when the dove may be killed, or they may themselves demand that open seasons, in those states where the bird is considered game, shall not include the nesting period.

More Ohio Bobwhites

We are gratified to note from the records of the last Christmas bird censuses, those for 1929, that the bobwhite, no longer a game bird in Ohio, still prospers. Out of eighteen parties making observations at Christmas time only three failed to see bobwhites. One man observed 135 birds during his day's walk about Indian Lake. Altogether fifty-two persons participated in these censuses, and they saw an average of 12 bobwhites each.

Contrast this record with the corresponding results in the adjoining states where the bobwhite is still regarded as a game bird. In Indiana there were six parties aggregating seventeen persons. They saw 57 bobwhites, or an average of three each. In Pennsylvania, a state that cultivates its game birds at the expense of other forms of wild life, sixteen parties, aggregating fifty-six observers, conducted Christmas censuses. These were able to find only 105 bobwhites during their day's tramping, or an average of about two birds each.

Were bobwhites migratory birds, we might think that they had left these states for Ohio, a sanctuary. But another, and an obvious explanation, seems to account for the dearth of bobwhites in Pennsylvania and Indiana, as contrasted with their relative abundance in Ohio.

The Plight of Wild Life

Natural enemies, diseases, starvation in times of stress—these ills our wild birds and mammals have always had. Then came man, with his civilization, and added guns, traps, snares, pitfalls, poisons, trained dogs, imitation decoys, live decoys, sneak boats, sink boxes, blinds, motor boats, baited waters and fields, market hunting, plumage hunting, hide hunting, all backed by the human (or inhuman) craze for self-adornment or selfish pleasure. Why should we wonder that our wild life is being swept from the face of the earth? And how easily, and with what added satisfaction to ourselves, we could dispense with most of these destructive agencies.

The Protected Bobwhite

Since 1915 the bobwhite in Ohio has been protected by law; it is no longer a game bird. Since that time the sportsmen have been obliged to forego the pleasure of hunting, with gun and dog, this favorite bird, and the income from sale of guns and ammunition must have been reduced. These are adverse factors. But there are benefits.

The farmers of the state are receiving added help from the greater abundance of an efficient weed-seed and insect eater.

The Nature lovers have increased enjoyment from hearing and seeing large numbers of this gentle and lovable bird.

The game commission need not import birds from Mexico annually to restock covers depleted from over-shooting, or turn loose a supply of tame birds, raised at an exorbitant cost.

Elaborate explanations that the stock of bobwhites has been depleted by hard winters and natural enemies are now unnecessary; for actual numbers of birds observed show that they are at least ten times as abundant as they were in the days of shooting.

Which is better—shooting or protecting?

PLANTING THE GARDEN, MONTH BY MONTH

BY ROMAINE B. WARE

"He who joy would win, must share it,
Happiness were born a twin."

BYRON

THE garden in midsummer holds a wealth of joy and happiness which may be increased many fold by sharing it with others. No true gardener can be selfish with the pleasures to be had from his garden. He may find that not every one appreciates his treasures as their beauty warrants, but by spreading the gospel of gardens he is adding to the sum total of the world's happiness.

Midsummer finds many tasks for the garden enthusiast and while planting is of a somewhat different character than in the months past there is much to be done along that line. Much of the success in garden planting results from recognizing the limitations of any one season and planting things at the right time. There are many things that should not be planted or transplanted at this time and there are others for which this season is just right. If you save seeds from your choice delphiniums, they will do best planted as soon as they are ripe. The best germination is to be had from fresh seed. Plant them thinly in rows using a soil made of leaf mold and sand with a little loam to stiffen it. The seed when planted is merely pressed into the surface to insure uniform depth and covered very lightly with sifted leaf mold. It will be wise to soak the soil thoroughly with one of the mercuric preparations for the prevention of damping off. It may save many times its cost in plants.

As your garden experience grows you will inevitably try to grow lilies and here will unfold one of the greatest of garden delights. In years past practically all lilies were considered difficult to grow but recently much information upon these "gems of the garden" has become available. Not only have we learned that they are not impossible but many amateurs are learning how to propagate them. The greatest garden lily of all, the "Regal," is being grown by countless thousands from seeds, and at this time of the year it is practical to propagate the Madonna lily and some other varieties by layering the stems that have just produced flowers. Just as the last flower fades the stems may be jerked from the ground and heeled in in the garden, covering the lower twelve or fifteen inches of the stem only, planting it slantingly. A half dozen and sometimes more bulblets will form within six weeks and some reach a size of three inches in circumference in that time. These may then be planted six to eight inches apart and an inch and a half deep in well drained beds, in a soil made light and porus with sand and containing a large

(Continued on page 63)

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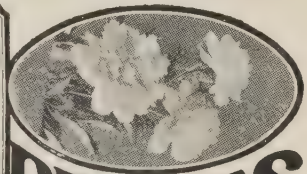

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NATURE NEWS and VIEWS

Oregon Trails Centennial

Just one hundred years ago, on April 10, a little band of adventurers set their faces toward the West. No fanfare of trumpets or plaudits of peoples drowned out the creak of their covered wagons or the plodding steps of their oxen as they departed. Through the valleys of the Kansas and Little Blue Rivers to Fort Kearney they went, then followed the North Platte to the passes through the Black Hills. Hence the banks of the Big Sandy River and the Bear River composed their thoroughfare, and at last they swung off the California trail at Bear River to plod by the shores of the Snake River to Fort Boise. At last, in sight of the Rockies, they stopped—the first party to travel the famous Oregon trail. Others later pushed beyond them to give the trail its name—along the fringe of the Blue Mountains to the headwaters of the Columbia, and by easy stages down to Fort Vancouver. There, at last, after privations, sufferings and hardships few today could endure, the settlers were free to unhitch their oxen, to put them before the plow—a task hardly less arduous, and surely of longer duration than that of snail-like travel.

To commemorate the exploit of these pioneers and those that followed in their footsteps, the Oregon Trail Memorial Association, founded by Ezra Meeker, is urging the school children of the nation to recall, during that period from April 10 to December 29, the 100th anniversary of the birth of Meeker, the heroic deeds of covered wagon days and their importance in the development of the nation. Doubtless, the adults, too, will wish to pay homage to these early settlers, and celebrations will of course take place all along the Oregon trail. The Memorial Association is sponsoring an essay writing contest in the schools, and the National Education Association has joined in urging nation-wide participation.

There is no dearth of material for essays or thoughts on the subject of the Oregon Trail. Perhaps the easiest and most available concerns the changes of the last 100 years. One today can roll over the smooth rails of the Union Pacific Railway from Bear River west following almost the exact route of the first caravan, and cover in hours territory which once could not be crossed in weeks. The same distances become even shorter in time through the use of the plane. Along the route of the Oregon Trail are prosperous farms, cities, resorts, instead of the wilderness.

Perhaps among the thousands of essays that roll in to the Oregon Trail Memorial Association there will be a few that will raise the question—Has all been progress during the past 100 years? Were the sufferings of the pioneers in the open spaces, though different in kind, much more intense than those of the thousands herded into cities, bound to spend their lives in the semi-gloom of factory or mill? While great natural wealth has been exploited, are the people of today richer in experience and contact with beauty, now that the plains are cultivated and their wild life destroyed, the hill slopes denuded, the streams polluted and their fish life dwindling? The caravan of covered wagons found endless herds of buffalo on the Plains, they saw the sun-clouding flight of the passenger pigeons, they heard the twilight whoop of the trumpeter swan. The shores of the Columbia they found wooded deep with 200 foot fir and redwood; where now the nakedness and gloom of the flat stretches of Washington and Oregon are broken only by the desolate spires of partly burned, leaveless trunks, once sunlight streamed through the thick, rich tangle of virgin forest. The brooks were alive with fish, the hills with wild life. Just one hundred years before the open spaces have dwindled to a few thousand square miles, and the entire nation has to wage a bitter fight if it wishes to save a few vestiges of Nature and a few typical examples of the natural life and scenery—these men and women who made the untouched West their goal saw the glories of untrammelled America.

Perhaps a few of the thousands of essays school children will write before December 29 will ask if the pendulum these pioneers set in motion has not swung too far, if people would not be happier and richer had the exploitation been less rapid and complete. But undoubtedly, those who write in this tenor will not get the prize.

A County Bird

The cardinal has been officially adopted as the county bird of Montgomery County, Maryland, as a result of a recent act of legislature signed by Governor Albert Ritchie. Legislative action followed a school vote wherein this bird amassed a large plurality over the bluebird, robin, Baltimore oriole, which is the state bird, and others. The school referendum was taken under the direction of Mrs. Benjamin T. Elmore, chairman of Conservation of the Women's Club of Bethesda.

Berrien County

Those born or having an interest in Berrien County, Michigan, will enjoy reading *Berrien's Beginning,* a short, comprehensive history of the county compiled by Ella Champion, with stories by Frances Huston Sink relating to some of the legends and tales of earlier days. Berrien County, it will be remembered, is closely associated with Chief Pokagon, Chief Black Hawk and the Pottawattamies. The book may be obtained from Miss Champion at Niles, Michigan.

Insect Hunting

Hunting insects with an airplane perhaps seems like studying bacteria through a telescope, but Professor J. H. Needham of the Department of Entomology of Cornell University, who recently returned from a three weeks' collecting trip to South America, is much enthused over the mode of travel he used. The plane allowed him to cover a great amount of ground, and to pick, from the air, the best places for collecting. He obtained material that will keep him and his associates busy a year before definite achievements of the trip can be announced

Parks in Winter

The 2,600,000 people who basked in the summer sunshine in the 23 National Parks may envy the park rangers their outdoor life, but the winter winds present a different view, and those snug by their firesides will find less to be jealous about after hearing what G. N. Paige, Assistant Chief Ranger of Glacier National Park, puts in very presentable verse in the January issue of the Glacier Park *Nature Notes:*

"Have you ever put in a winter
  Where the wind seems always to blow,
Sweeping down from the bleak mountain passes,
  And most every day brings more snow;
In a cabin set back in the timber
  Somewhere near the Canadian line;
With white peaks of the Rockies as guide posts
  While patroling through forests of pine?

"Four log walls: they are barren of pictures;
  Just two windows; a snug fitting door;
There's a cot, and a table, and cook-stove,
  And tin dishes you've used once before.
All the meals are of sour dough for hot cakes,
  Or vegetables brought in a can,
Or dried prunes, navy beans, ham and bacon,
  That were packed in ere winter began.

"You snowshoe twelve miles to the mail-box
  Where weekly the stage passes by;
The stage horses find it tough going
  Through snow that is piled shoulder high;
You receive a whole arm-load of papers,
  A week's issues all come in one bunch,
So that night you are reading past midnight
  To try to get caught up at once.

"While the cold settles down in the logs
  With a snap like a pistol's shot,
While the mercury drops and keeps dropping,
  While the good, little stove glows red hot.
In morning the creeks are all frozen,
  Oh that's most important, indeed!
For you chop through the ice to the bottom
  To get all the water you need.

"You must snowshoe all over the district
  To make sure that all poachers stay out,
And you follow the tracks in the fresh snow
  To study what has been about.
You soon learn that all troubles and trials
  Are not fastened on people alone,
That each little beast of the woodland
  Has some troubles and trials his own.
. . . . . .

"You come home all tired out in the evening;
  Stand the snowshoes alongside the door;
And you think that this cabin's a blessing
  When the long day's journey is o'er.
When the fire's again brightly glowing,
  There's nothing much else left to do,
But to wait for the coffee-pot's singing,
  And my! Smell the Mulligan stew.

"If you've ever put in such a winter,
  Though at times you have found it quite tough,
You have proved to yourself and your fellows
  That you're made of about the real stuff.
There are others with lives far more easy,
  With parties and dances and shows,
But give me the snug snowshoe cabin
  In the woods where the free, wild wind blows."

Radio and Fire

Every educational force in the country must be employed to warn motorists and campers and smokers against fire carelessness if the forests of the country are to be saved. The radio has wonderful possibilities, and a recent broadcast through New York and New England by the Standard Oil Company of New York over WEAF will, it is to be hoped, be but the first of many to reach the motoring public. The sketch related the adventures of an automobile party whose careless neglect of a campfire brought results exciting and disastrous, and vividly portrayed the part played by forest rangers in lessening the damage caused by thoughtlessness. The forest-fire death toll is mounting yearly, and the property damage is high in the millions. The Standard Oil Company is doing a public service by such broadcasts, and may cause other companies and radio stations to lend a hand in a public problem.

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WILD FLOWER PRESERVATION SOCIETY
3740 Oliver St. Washington, D. C.

HELPS AND HINTS FOR HOME AND GARDEN

(Continued from page 61)

supply of humus. They will produce blooming size bulbs in one to two years.

DELPHINIUM should be cut back when the flowers begin to fade, not allowing seed to form unless you wish to save it. A second display of bloom may be had by cutting back to within eighteen inches of the ground, dressing each clump with a couple of handfuls of steamed bone meal and seeing that they do not want for water. Don't overlook the regular and thorough spraying with Bordeaux every ten days to prevent blight. See that every part of the foliage surface is covered because the spray material acts as a protective coverage.

DAPHNE CNEORUM is one of the most beautiful of the early flowering dwarf shrubs and as gardeners become familiar with it, more universal planting will result. At this season it is easily propagated by layering the trailing branches. First make a little incision in the under side of the stem and then bury it an inch to two inches underground where it will root and the outer end become the new plant. Within a year the new plants may be separated from the parent plant and moved to new locations. In the past this wonderful flower has been found to be most uncertain but it seems now to be firmly established that it will thrive in a soil of peat, lime, and loam. The lime is best furnished by the use of old mortar-rubble which you should be able to secure by watching out for some place where they are tearing down buildings.

DO not neglect the heavy mulching of sweet peas to keep the ground cool and moist. If the roots are kept cool and plenty of moisture supplied together with spraying and feeding, you can cut liberally right through till frost. Violas should be cut back that they may make new top growth and produce another crop of blossoms this fall. The same applies to bachelor buttons and other things that have produced one crop of bloom. If you have large clumps of perennial phlox their season of bloom may be greatly extended by cutting back every other stem just removing the budded top before it blooms. New side growth will promptly start from the stems but it will not flower till after the uncut shoots are through.

THE chimney bellflower, *Campanula pyramidalis,* can be propagated by cutting up pieces of root into two inch lengths and planting them about two inches deep right where you want them to bloom. This bellflower is an ideal subject for the middle and rear of the hardy border and its season of bloom may be greatly extended by cutting off the individual blossoms as soon as they fade.

CHOICE and scarce varieties of tulips and other spring flowering bulbs should be ordered at once as many of them are only

(Continued on page 64)

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Vote on Anthem

While a bill to make *The Star Spangled Banner* the national anthem languishes in Congress, the school children of America are rallying to the polls in another National election, this time conducted by the American Education Press, to decide whether this song or *America the Beautiful* is most worthy of serving as a national anthem. The American Education Press are the publishers of three very useful school publications—*My Weekly Reader, The News Outline,* and *Current Events,* all three of which most cordially cooperated in the American Nature Association's National Flower Poll and brought out a large school vote. More than six million school children will undoubtedly take part in the present campaign. There are many arguments in favor of both songs. From the Nature point of view, *America the Beautiful,* written by Katherine Lee Bates, is preferable, since it symbolizes the natural wonders of the nation. *The Star Spangled Banner* is much more warlike and typifies more the political aspects of the United States. Its music, however, defies most every one but a coloratura soprano; while the music to which the other song has been put lacks much in rhythm and vivacity. All children should express their opinion on this not unimportant question in the class room, and have the teacher send on the results to Columbus, Ohio, to *Current Events*. If a number of the pupils think Congress should not act now, this vote should also be registered.

Training Tree Surgeons

Popular demand for a correspondence course in tree surgery has led the early successful Van Yahres School of Tree Surgery, Westbury, Long Island, New York, to prepare an eight weeks' course covering the main aspects of the subject, and to offer in connection with it to those students satisfactorily completing the course, a week's practical work at the school. While mainly theoretical in treatment, the seven lessons which have been prepared by the botanist and entomologist of the school, C. F. Greeves-Carpenter, a frequent contributor to Nature Magazine, covers the structure of trees and their growth, soils, fertilizers, pruning, insect and fungus diseases, and other tree ailments, as well as practical discussions of methods of curing and saving trees. The School offers to hire students who show special aptitude for the work, to become members of their regular staff of tree experts. The cost of the course is $50.

Practical Zoology

A series of practical exercises in zoology to accompany the author's *Science of Animal Life* has recently been prepared by William Morton Barrows of Ohio State University, and should serve as a valuable laboratory book even where his text is not used. As the author states, the manual is designed to aid in the developing of methods which will some day enable the biology course to deal with living forms. It is published by the World Book Company, Yonkers-on-Hudson, New York, as one of their World Science Series, at a price of forty-eight cents.

HELPS AND HINTS FOR HOME AND GARDEN

(Continued from Page 63)

imported to order and frequently the supply is quite short. It is to be hoped that you selected some of them in bloom this spring but if you did not there are several large dealers who illustrate their catalogues with color reproductions. Bulbs are one of the joys of the spring garden and few of us plant enough of them. Next month being a good time to start pansies for spring color effect, it is well to order your seed soon. They are one of the flowers in which the quality of the seed is most important. There is a tremendous difference in the quality of seeds and it pays to buy where you have the utmost confidence that you are getting the best strain available.

IN many respects this is a trying time in the garden. No matter how carefully you may have made your plans to produce satisfactory effect at this time, there are many eventualities that may intervene. But rather than be discouraged, you should study the problem carefully and try to discover how it may be improved next year. Careful records made in a garden note book will be of great assistance in achieving the desired results.

Words of Wisdom

Though Dallas Lore Sharp is gone, his words still ring out to designate the pathway Americans should take. In one of his last books, *Sanctuary, Sanctuary,* he wrote: "Stop killing and start creating. Stop cutting and start planting. Stop wasting and start saving. . . . Whoever pollutes a stream poisons a people, no matter how many wheels the water turns, how many mouths the mill may feed. . . . For every stick of timber cut, a seedling can be planted. And even if, in the wise future, we can declare the open season on certain forms and in certain places, every thoughtful sportsman knows that today, should the shooting he desires for himself be claimed by all, it would make a wild-life morgue of America before the pup he is training has been broken to gun. . . . In every school room up and down the land . . . let talk about birds and beasts and flowers and trees be started, let tramps afield be taken, and so, in every school-child's heart let love be planted, till knowledge of conservation be next to reading, writing and arithmetic, and love of Nature next to love of God and neighbor. That for the future."

Vermont University Refuge

The University of Vermont is establishing a 92 acre bird and game sanctuary on the southeast border of Burlington, as a result of a Nature move sponsored by a group of outdoor lovers who saw a beautiful section covered with primeval timber about to pass into the hands of lumbermen. The refuge will be used as an outdoor laboratory for college students and others interested in forestry, zoology, botany and kindred sciences, and is in charge of Prof. H. F. Perkins. The tract is heavily wooded with pine and hemlock, and is said to harbor much bird and animal life.

British Empire Conservation

The Society for the Preservation of the Fauna of the Empire has been moderately successful in enlisting American financial aid in its project of conservation which embraces the entire commonwealth of nations. The task it has set itself to do—to save the wild life over the entire Empire—is gigantic, yet it must be done, because this Empire contains over 70 per cent of the surviving land mammals of the world, and nearly 90 per cent of all the existing species. With such a heterogenity of human populations and political factors, with so many millions, especially in India and Africa, who are totally ignorant of the necessity of saving, its problems are really greater than ours. As the Society rightly says: "The perpetuation of the wild life of the world is a duty which nations in the forefront of civilization cannot ignore, with due regard to the needs of mankind. It is claimed that it is an international obligation."

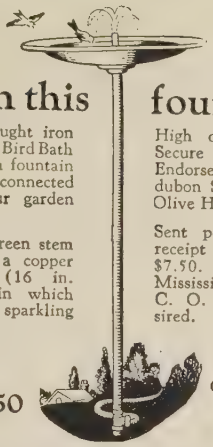
A Nature Trail

To see a tree with *Dioon edule* marked on it is nowhere near as interesting as to discover as a legend along a Nature trail: "Even a blackguard like the wild grape has strict laws of conduct unto itself. It will be found always to coil its tendrils in a clockwise direction. Some vines are just as religiously counter-clockwise twiners." The latter caption is one of the many that have attracted attention in the North Cagrin and Brecksville parks of Cleveland, Ohio, where originality and wit have combined to make the Nature trails in the two parks interesting to all comers. As *Playground and Recreation* of March points out, quoting the above and other legends, Nature guides and park officials are using much ingenuity in making the markers tell so fascinating a story that the hiker will increase his knowledge in a most pleasurable way. The new method, so well illustrated by this Cleveland program, indicates how rapidly Nature teachers are realizing that they must popularize their information or at least make it digestible to get converts.

Outwitting the Cat

How a mother and father bobwhite pitted their cleverness against that of a cat, and saved their little brood, is told by Miss Beatrice Limstrong, of Mackeys, North Carolina. She came on the scene just in time to see the chicks scurry from under the outspread wings of the female, who took up a position on a log and stood looking anxiously toward the house. The father bobwhite walked quickly but quietly under a nearby fence, and went toward the spot which seemed to be giving concern. Then he, too, stopped, his eyes riveted on a house cat which came nearer and nearer. Presently, the cat stopped, lay down for a short time, then rose, and returned to the house. It acted all the time as if it had not seen the birds. As soon as it was gone, the father returned to the female, the mother gave a little cluck, and out of a heap of brush came the little ones. At once the entire family scurried out of the danger zone to another field. Such presence of mind, courage on the part of the father, and the wise silence of the young had undoubtedly saved the day.

Attract Song Birds



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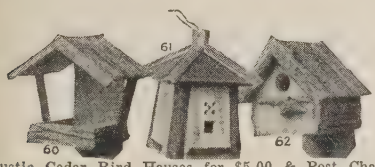

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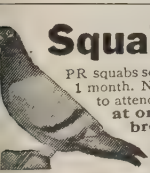

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The Robin's Bride

Each year to a certain home in Cleveland, Ohio, comes a male robin, to build his home in a large apple tree, and to make happy with his song and his antics an invalid whose days are spent by a window in full view of the tree. A friendly bird he has seemed, for as soon as he arrives with his mate, he flies up on a limb directly opposite the window and chirps a homecoming song. Then he brings his bride, and later the two build in the tree and raise their brood. Last year, he once more returned, but with him was not the usually colored mate, but one wearing an ensemble of white with her dark feathers. Her breast was white, and the wings were mottled brown and white. The male seemed to be unusually proud of this strange bird, and to sing even more vigorously, as if to attract attention to her plumage. In due season they built a nest and hatched a brood and were gone. This season, writes Mrs. Gertrude Thomas, an eye witness of the happening, the same two appeared again. The female had lost some of her white feathers, and only a few white spots remained on the breast. But the male seemed more fond than ever of her, and the spring passed happily for them and for the invalid who watched them every day.

THE LAST HEATH HEN

(Continued from page 37)

seldom been accorded his brethren—if it had, a different story would now be told.

He is a symbol, this last heath hen, silently living out his few remaining days amid the scenes of former heath-hen glory—a symbol of the slowly but steadily departing wild life. His pathetic figure carries the tragic story of the passenger pigeon, the great auk, the Carolina paroquet—and the heath hen. For these only one epitaph need be written—"Created by Nature's bounty, destroyed by the wantonness of man."

The State of Massachusetts has helped conservation immeasurably by its efforts to save the heath hen. The dramatic passing of the last specimen may so stir the imaginations of men as to make it impossible for other dwindling races to be exterminated at the hands of humans. If so, the last heath hen will have done his share; his race will have been exterminated not entirely in vain.

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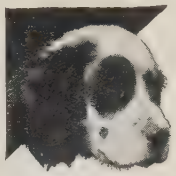

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"Ingagi"—True or False?

If "Ingagi", an alleged Nature film, supposed to have been completely taken in Africa, and now being distributed by the Radio-Keith-Orpheum Distributing Corporation, is genuine, it reveals facts about aboriginal tribes and African wild life never proved before. If it is a fake, it is an imposition on the public, a blot on the moving picture industry, and a serious threat to the usefulness of moving pictures in Nature education.

The film, in its captioning and advertisements, professes to show a colony of natives, newly discovered, from which, each year, a woman is taken to be sacrificed to the gorillas. It purports to reveal a group of half-wild women who live with the gorillas, and is replete with sensational "shots"—of a gorilla carrying off a woman; of a queer animal "new to science"; of lions attacking men; of a native woman mourning the death of a gorilla, and of other happenings equally startling in character.

While the cinema is good entertainment, so great is the danger that the public will accept all its "revelations" as scientific truth that certain inaccuracies should be pointed out. We do not say the entire film is unauthentic; but we offer the inaccuracies so each spectator may judge for himself the degree of credence to place in the whole:

A 600-pound gorilla is supposed to play an important part in the moving picture. The largest specimen ever recorded weighed but 460 pounds.

Close-ups of the animal, professed to be the same creature, reveal him to be, in the opinion of scientists, an orang-outan, an animal that lives in Borneo and Sumatra.

The beast, so "venomous" that it could not be brought to America, resembles a leopard tortoise, which is not harmful, but which had been clothed in the skin of a pangolin or "scaly anteater" and draped with varnished or shellacked bird wings for effect. The head of the creature was certainly that of a member of the tortoise family, and no animal with such a type of head is known to be "venomous".

The leaves surrounding the nest of the alligator, botanists agree, are apparently those of a eucalyptus tree, which does not grow in Africa, but is common, however, in California. Monkeys with prehensile tails are peculiar to tropical America, yet one appeared in the film, and another strictly American animal, an armadillo, is shown digging in what purports to be a deserted African village.

The woman alleged to have been put out for the gorillas wore one costume before the animal appeared, but in the next scene, she was differently arrayed. Yet only a few minutes were supposed to have passed, and she was alleged to have been abandoned by her people in the midst of the jungle.

The walk of the supposed gorilla was, at times, not that characteristic of the race. It closely resembled, however, the gait of a man imitating a gorilla.

The struggle against Nature ignorance and superstition has been long and difficult. Occasionally some clever bit of "Nature-faking" appears that tends to destroy the confidence of the public in all Nature work, and retards the whole movement. Several good pictures, accurately taken, scientific in tone, with no attempt to exploit or sensationalize, have come from Africa. "Simba",

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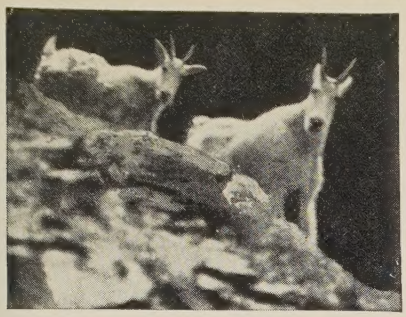


All who have seen the Finley pictures in the past will agree that these pictures are the best yet.

An ideal feature for the winter program of Hunting and Fishing Clubs, City Clubs, Nature Clubs; and absolutely unique as a private entertainment.

WONDERFUL LECTURE *on* WILD LIFE

Camera Hunting on the Continental Divide With Thrilling Moving Pictures by WILLIAM L. FINLEY Famous Explorer and Lecturer

who made these remarkable pictures on the two recent Pack-Finley expeditions into the northern part of the Rocky Mountains, under the auspices of the American Nature Association, will lecture with them personally during the coming season

You who have read the story of the expedition, appearing in Nature Magazine during 1928 and again in the recent 1929 issues, will be more than ever eager to see these pictures and hear Mr. Finley. Rocky Mountain Goats—outwitted by the use of a goat disguise, photographed within 50 feet. Moose—that threatened the cameraman, and at one time came too close for his comfort. Beaver—photographed in the wild, cutting branches and building a dam. Bighorn Sheep—high up on the mountain passes. Pronghorn Antelope—photographed from a pursuing automobile travelling at 45 miles an hour. Herd of Elk—fording a river. Bears—raiding the camp. Conies, deer, marmots, ptarmigan, jays, Franklin grouse or fool-hens, and other birds of the high peaks.

Dates for the coming season should be arranged as soon as possible by addressing

EXTENSION DEPARTMENT, AMERICAN NATURE ASSOCIATION
15 BOUDINOT STREET, PRINCETON, N. J.

'On Safari" and others have enabled the ublic to glimpse the wild life of the Dark Continent under conditions as near natural s possible. They have shown the possibility f bringing wild life from all parts of the lobe within the sight of the cinema patron. But one single "faked" picture will cast an removable stigma on the whole field, and aise doubts in the minds of the public rearding all Nature films. If anybody with a ense of the dramatic and a motion picture amera may go to Africa—or Hollywood—nd pass off on the public, without censure, ikes purporting to reveal new scientific ruths, the motion picture as a Nature edutor will have utterly lost its value. We do ot say that "Ingagi" is of this type, but refer to let the spectator judge in the light f the facts. We do feel that its spectacular eatment of gorilla life is ill-advised, beause the gorilla is rapidly losing ground n Africa, and this film, by presenting a noral reason for his extermination, will elp remove every check on his destruction. The gorilla is one of the species closest to nan, and with the rapid development of nedical science, no one knows when it will e tremendously important as a source of ew medical information. For this reason lone any propaganda implying that the vorld would be better without the few remaining gorillas is to be deplored.

If photographers in Africa did discover ctual substantiation for ancient and hoary egends of the jungle, if they made such cientific discoveries as the cinema relates, nen they were most unfortunate when obvius inaccuracies and patent fakings were so namelessly included in their record as prevent intelligent, informed people from placing any credence whatsoever in the film.

Using the Split-nail

Naturalists have long puzzled over why one of the five toes on a beaver's hind foot has two claws, one regular and the other setting sidewise, and no adequate explanation has been forthcoming. Mills, Seton and Warren have suggested that the two claws were used as a "comb" to comb out parasites. But "Trapper" Evans of Livingston, Montana, according to Dorr Yeager, Park Naturalist of Yellowstone, writing in the Yellowstone *Nature Notes,* claims that the claws serve as a toothpick, with which to get splinters out of the teeth. The trapper states definitely that he has seen them use the split-nail many times in this capacity. Naturalists are apt to decry this theory, but at least it is plausible, and it is not beyond the range of possibility that perhaps the claw is used in both ways. Certainly a beaver would be in bad with a sliver between his teeth and no means of removing it.

Tree Conference

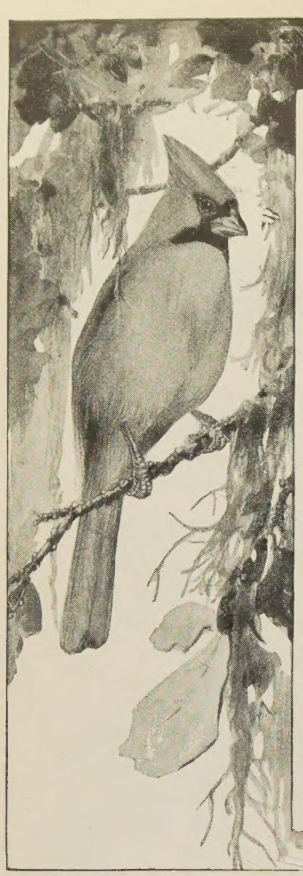
The Sixth National Shade Tree Conference, where the latest developments in equipment, materials and treatment for saving of trees will be demonstrated, is to be held in Cleveland at the Public Auditorium during August 27, 28, and 29. Symposiums will be held on the more important phases of shade tree protection, and numerous exhibitions of methods recently worked out are to take place. The exhibition hall will be open to the public without charge.

Bird Contest Winner

Because Ed Harlan, Jr., of Charlotte, North Carolina, knows birds and loves them, he is $50 richer. His article entitled "Why We Should Protect Our Birds and How We Can Do It" was deemed the most inspirational and constructive of the many submitted in a recent contest conducted by the Boy Scout Council in Charlotte. He cites as the reasons for protecting birds their insect-destroying and weed-seed eating proclivities, and the best ways of protecting them by winter-feeding, education, and the elimination of stray cats. Attaching bells to the necks of cats is likewise helpful, he writes. Boy Scouts have great opportunities to promote the welfare of birds, and have already proved a factor. Such contests as these are invaluable.

Butterflies' Egg-laying

The regal fritillary, one of the most beautiful of northeastern butterflies, commonly lays its eggs on the violet, the ordinary foodplant for the caterpillar, but Miss Cynthia Church, of Great Neck, New York, writes of a recent experience at Montauk Point where this species was abundant and where the seaside goldenrod became the host to the eggs. She said she did not observe the butterfly lay on any other species of goldenrod. The egg was deposited on the under side of the leaf, out of harm's way. She likewise saw a number of individuals of *Cetopsilia eubule,* a southern butterfly, most uncommon in the north. Long Island evidently is a butterfly enthusiast's paradise.



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Airplane Hunting

Airplanes for hunting is the latest mode, according to advices from the Upper Peninsula of Michigan, where, last winter, S. E. Hammond of Owosso and Talbert Abrams, president of the A-B-C-Airline Corporation travelled over the Blaney Park by air, reconnoitered to discover where the deer were hiding, and then came to earth to bag their prey. The deer, frightened by the noise of the propeller, left their cover and came out in the open. With due regard to the hunters, we cannot commend their efficiency. It would have been much quicker to drop bombs on the deer, or to attach machine guns, and strafe the deer as the plane swooped over their hiding places. With this already in vogue, we expect to discover any day now that poison gas is being used.

Animal Acquaintances

Another chapter has been written on experiences with animals from the zoological park point of view, this time in *My Life with Animals* by George F. Morse, former director of the Boston Zoological Park and Boston Aquarium, and the Zoological Society of Chicago and the John G. Shedd Aquarium Society of Chicago. Obviously Mr. Morse knows what he is writing about and he has had many interesting and remarkable experiences to bring to the present volume. Through the book, he says, "I hope to inculcate in the mind of the great public which throngs our zoos different ideas and a greater respect for the dumb creatures that look out from behind the bars." He succeeds admirably. The publishers are Thomas S. Rockwell Company, Chicago.

Johnny Appleseed

Vachell Lindsay has immortalized him in poetry, and now comes the prose story of *Johnny Appleseed* by Henry Chapin. This fascinating and historic figure, who planted for the future which he would not live to see, has become legendary. His peregrinations as he pioneered westward, meeting with Indians as a fellow man, clearing and planting orchards with the seed of apple trees stowed in his doublet, are full of romance. It is a story of a remarkable character with vision and a striving for far horizons. The adventures of Johnny Appleseed, and his inspiration, Mr. Chapin has admirably fashioned into a charming document filled with both historic and romantic interest. His publishers are Coward-McCann, New York City.

The American Tree Association stands for a constructive policy of forest protection and extension, to increase appreciation of forests as natural resources essential to the sound economic future of the country.

The Association directs encouragement of tree planting by the public; disseminates popular forestry news for the information of editors of the daily press; and compiles and distributes forestry news and reports on legislative progress for assistance of active foresters in the field.

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MEMORIAL TREE PLANTING TO MARK WASHINGTON BI-CENTENNIAL IN 1932

TREE PLANTING in honor of George Washington will be one of the major activities of the bi-centennial program marking the two hundredth anniversary of the birth of Washington. The details will be handled by the American Tree Association on plans worked out in conjunction with Mrs. John Dickinson Sherman, who, with Mrs. Anthony Wayne Cook, is in charge of women's activities. The association will give centennial certificates of membership in the tree planting army and it is expected ten million trees will be planted in connection with the celebration.

"George Washington was a woodsman and a tree planter," said Charles Lathrop Pack, the president of the Association. "His diary contains repeated references to the value of trees and their care. Great programs are being put underway by the Bi-Centennial Committee. The tree planting is a thing the individual can do. Thus he can have a very real part in the celebration.

"We are sending out our bi-centennial tree planting call to thousands of women's clubs, scout and camp fire organizations as well as civic and city beautiful associations. The new highway from Washington to Mt. Vernon is to be planted with trees. We are suggesting highway planting in every state. The 1932 graduating classes in schools and colleges are invited to plant George Washington memorial trees. The American Legion has plans under way for memorial forests and town forests. We expect to see the George Washington tree planting break all records and estimate that there will be planted, as part of the program in celebration of his birth, at least ten million trees."

Mrs. James H. Dorsey of the Maryland D. A. R. whose "grandchildren" of the George Washington Elm at Cambridge, Mass. the American Tree Association of Washington will help plant. Through the Association several of these "grandchildren" are to be planted during the George Washington Bi-Centennial celebration in 1932. Two of them are to have places of honor on the new boulevard from Washington to Mt. Vernon. The "grandchild" in this photo stands in the grounds of the headquarters of the Sons of the American Revolution across from the headquarters of the American Tree Association.

"Under the plan of cooperation between the American Tree Association and our committee," said Mrs. Sherman, "the association will take over the tremendous details of memorial tree planting for the first president of the United States. As the organization has the machinery, we welcome the cooperation."

Tree planting of national interest in connection with the program of the American Tree Association will be the placing of "grandchildren" of the Washington Elm that stood at Cambridge, Mass. Mrs. James H. Dorsey of the Maryland Daughters of the American Revolution has several of these "grandchildren." Two of these trees are to be placed on the memorial highway from Washington to Mt. Vernon.

The association asks that all organizations name George Washington Bi-Centennial Tree Committees at once and such committees list their appointment with the association in Washington. A like request is made of all schools, colleges and societies, fraternal or commercial. The women's clubs of the country have committees for this work with which the association is in constant touch.

President's Tour Is Expected To Attract Visitors to Parks

THE announcement that President Hoover is contemplating a tour of the national parks this Summer will undoubtedly stimulate interest in the parks and perhaps persons who might plan to go to Europe or other foreign shores for a vacation will reconsider and go to the parks instead, the Acting Director of the National Park Service, A. E. Demaray, stated orally May 14 at the Department of the Interior.

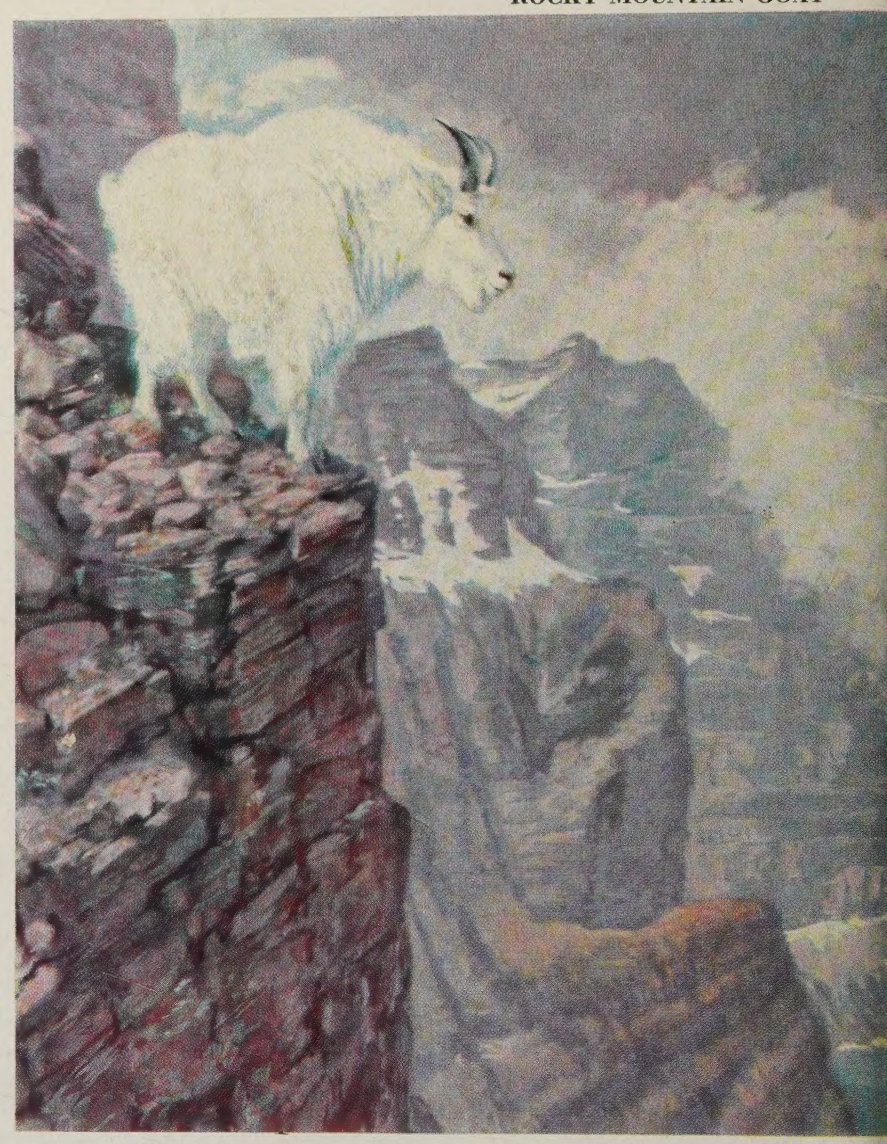
The President's interest in the parks will be reflected in an interest on the part of the public in general, Mr. Demaray said.—*United States Daily.*

■ ■ ■

Nature Parties Also Attract Visitors

and in strictly limited, personally conducted groups, will travel, away from tourist routes,

IN



ROCKY MOUNTAIN GOAT

YELLOWSTONE • GLACIER • JASPER
ZION • GRAND CANYON • BRYCE

OUR President will not be the only one to enjoy these Western wonderlands. Seven small groups, interested in truly knowing our national playgrounds and what they hold, will be there also. Personally led and accompanied by a Nature guide,—roughing it a bit,—lingering long enough really to see,—these parties will leave during July and August.

This is the second season of these remarkable and different trips. Based on years of field experience, they are offered at the lowest prices possible. They have no counterpart in Western trips.

Write for the booklet "ON WESTERN TRAILS", and for information as to possible vacancies still remaining. We cannot guarantee places available in all parties when this appears. Nevertheless, get acquainted with these trips.

AMERICAN NATURE ASSOCIATION

1214 Sixteenth Street

Washington, D. C.